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MACKENZIE VALLEY PIPELINE INQUIRY

Government
Publications

IN THE MATTER OF APPLICATIONS BY EACH OF
(a) CANADIAN ARCTIC GAS PIPELINE LIMITED FOR A
RIGHT-OF-WAY THAT MIGHT BE GRANTED ACROSS
THE NORTHWEST TERRITORIES; AND
(b) FOOTHILLS PIPE LINES LTD. FOR A RIGHT-OF-WAY
THAT MIGHT BE GRANTED ACROSS CROWN LANDS
WITHIN THE NORTHWEST TERRITORIES,
FOR THE PURPOSE OF A PROPOSED MACKENZIE VALLEY PIPELINE.

and

IN THE MATTER OF THE SOCIAL, ENVIRONMENTAL AND
ECONOMIC IMPACT REGIONALLY OF THE CONSTRUCTION,
OPERATION AND SUBSEQUENT ABANDONMENT OF THE ABOVE
PROPOSED PIPELINE

(Before the Honourable Mr. Justice Berger, Commissioner)

Inuvik, N.W.T.

February 16, 1976

PROCEEDINGS AT INQUIRY

Volume 126

APPEARANCES:

Mr. Ian G. Scott, Q.C.,
Mr. Stephen T. Goudge,
Mr. Alick Ryder and
Mr. Ian Roland for Mackenzie Valley Pipeline
Inquiry;

Mr. Pierre Genest, Q.C.,
Mr. Jack Marshall, and
Mr. Darryl Carter for Canadian Arctic Gas
Pipeline Limited;
Mr. Reginald Gibbs, Q.C.,
Mr. Alan Hollingworth &
Mr. John W. Lutes, for Foothills Pipe Lines Ltd.;

Mr. Russell Anthony &
Pro. Alastair Lucas for Canadian Arctic Resources
Mr. Garth Evans Committee;

Mr. Glen W. Bell and
Mr. Gerry Sutton, for Northwest Territories
Indian Brotherhood, and
Metis Association of the
Northwest Territories;

Mr. John Bayly
or
Miss Leslie Lane for Inuit Tapirisat of Canada,
and The Committee for
Original Peoples Entitle-
ment;

Mr. Ron Veale and
Mr. Allen Lueck for The Council for the Yukon
Indians;

Mr. Carson H. Templeton, for Environment Protection
Board;

Mr. David Reesor for Northwest Territories
Association of Municipal-
ities;

Mr. Murray Sigler for Northwest Territories
Chamber of Commerce.

Mr. John Ballem, Q.C., for Producer Companys;

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Snow, Logan, Pettigrew
Cross-Exam by Evans

Inuvik, N.W.T.

February 16, 1976

(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

THE COMMISSIONER: We'll come to order, ladies and gentlemen. I think we're ready to proceed.

MR. EVANS: Mr. Commissioner, I believe that it's my turn to cross-examine these witnesses. The testimony by Mr. Pettigrew, Dr. Snow and Mr. Milne provided a great deal of information on the nature of potential problems on the conception of oil spill contingency plans. However, we haven't had very much evidence presented on the implementation of contingency plans and so much of the time that I'm going to be cross-examining will be devoted to this aspect of oil spills.

NORMAN SNOW,
WILLIAM J. LOGAN,
R. K. PETTIGREW resumed:

CROSS-EXAMINATION BY MR. EVANS:

Now, Mr. Pettigrew and Mr. Logan in section E-5 of your testimony -- of, I guess, Mr. Pettigrew's testimony, particularly sections B and C, which relate to discovery and notification, containment and countermeasures, clean-up and disposal; I wonder if you could bring these topics into perspective, using, as an example, a major oil spill incident in which you have had involvement.

WITNESS PETTIGREW: I would like to run through a pipeline oil spill that occurred -- there've been a number of them that occurred in Alberta, Saskatchewan on some of the major pipeline systems. I

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1 thought if I used this one for reference that we would
2 be somewhat more pertinent to the Mackenzie pipeline
3 that we've been talking about. I'll refer to this one
4 as the Strome and Killam oil spill. These are names of
5 small towns in Alberta, southeast of Edmonton. So, if
6 you hear the words "Killam", you'll know it's a place
7 name.

8 In trying to reconstruct or
9 redevelop the scene, I'd better comment briefly on a
10 few points. There is the main pipeline systems which
11 feed out of Alberta and out of Edmonton. There is a --
12 you just have to focus that a bit. I don't need that
13 one right away, I'll turn it on, Lorraine, when I need
14 it, if you can just focus it. O.K.

15 But the main pipeline systems
16 consist of a ten inch, twenty-four inch and a thirty-
17 four inch diameter pipeline system from Edmonton down to
18 the head of the Great Lakes and delivering oil to
19 eastern Canada and the eastern United States in the
20 amount of -- order of magnitude, something in the order
21 of 1.2 million barrels a day, through the three line
22 systems. About a year and a half ago, there had been
23 over the past twenty years or so, certain line breaks
24 and about a year and a half ago, there was one that
25 started a series of line breaks on the thirty-four inch
26 pipeline system.

27 The thirty-four inch alone
28 carried about 900 thousand or a million barrels a day to
29 eastern Canada. The first break, and I'm going to be
30 doing some of this from memory and I'll refer to brief

Snow, Logan, Pettigrew
Cross-Exam by Evans

1 spill reports and other conclusions. I won't drag this
2 out excessively. I'll try and give you the highlights.
3 The first split in this thirty-four inch pipeline occurred
4 on the 28th of January, 1974 at a time when the temperature
5 was 30° below zero on the prairie and the leak was found
6 at 10:30 in the morning.

7 Now, if I backtrack from that
8 a little bit, the pressure drop was noticed at their
9 control station at 0840 hours. The line was immediately
10 shut-in, an aircraft immediately dispatched from
11 Edmonton, and the leak was found, located at 10:30 a.m.
12 or about -- it took about two hours to locate the leak.
13 We first -- the pipeline company followed through on
14 their internal reporting and external reporting, and I'll
15 explain those terms in just a minute -- consequently
16 there was quite a broad information flow in communication
17 linkage set up. Immediately they knew they had an oil
18 spill or a pipe break -- pipeline rupture.

19 The -- this was interprovincial
20 it's been well publicized, the interprovincial pipeline --
21 I'll refer to them. They dispatched men to the scene as
22 soon as they had isolated the pipe break and dispatched
23 equipment from Edmonton and from the opposite direction
24 from one of their stockpiled areas beyond the break --
25 Strome or one of their pumping stations.

26 The question of volume was un-
27 known for a number of hours. It usually is and an
28 estimate, however, early on, an estimate was made that
29 some ten to twenty thousand barrels had been spilled.
30 The cause was undetermined in the initial phase and it

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Cross-Exam by Evans

1 take a period of time for assessment and an evaluation
2 to come to such numbers, calculations, and so on. The
3 spill was reported confined to a low slough area in the
4 vicinity of the pipeline right-of-way, oil was soaked into
5 snow, and the snow and the temperature hampered clean-up
6 efforts. Within a few hours, suction trucks and bull-
7 dozers and equipment were on site.

8 It was known that the numerous
9 sloughs in the vicinity of the spill served as
10 feeding areas for migratory birds and geese. Another
11 point, the twenty inch diameter pipeline and the twenty-
12 four inch diameter pipeline remained in service. By
13 ten o'clock the following morning, some two thousand
14 barrels of oil had been recovered. They were pumping
15 very viscous crude. Viscous because of the low tempera-
16 tures and sludge, ice and snow with considerable diffi-
17 culty.

18 A day later, another report
19 a day later -- by the way, I forgot to point out that
20 when they had recovered the -- that pipeline section,
21 they had found a split in the -- in one section of
22 pipe along a horizontal weld four feet in length. This
23 was repaired. The jointed pipe was replaced and the pipe-
24 line put back on production. I'd have to check as to
25 just how many hours that took. A quick guess would be
26 fifteen hours. This was only back on production about
27 a half a day when a hundred and fifty feet further along
28 the same pipeline, another break occurred. It eventually
29 turned out that this second split was again along a
30 welded horizontal seam and was nine feet in length.

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Cross-Exam by Evans

1 I have a slide here of this one and it might be just
2 as well to put that on at the moment. It gives an imp-
3 pression of what a jointed pipe looks like that has
4 broken under rupture. Incidentally, just as we look at
5 this, I think that's slide number one there. That's well
6 in focus.

7 This one may be the one the
8 nine foot split -- or maybe it's the four foot. It
9 doesn't matter a great deal, but it shows what happens to
10 a jointed pipe thirty-four inches in diameter wrapped,
11 split along the seam. It just opens up, you can put
12 your arm in it and a line like that, carried about 800
13 pounds pressure; 800 pounds per square inch pressure
14 during normal working throughput conditions and when a
15 rupture like that occurs, the pressure drops immediately
16 to a very low value and alarms are pretty loud in the
17 control station -- the nearest pumping stations. This
18 actuates their own contingency plan and action plan.

19 The Interprovincial Contingency
20 Plan for Action has been tested over some years and in
21 my opinion, is -- has been -- is quite effective. If
22 we can have the lights, again, please.

23 Another point I might mention,
24 interprovincial, just as a normal course of investigation,
25 take samples of faulty pipe in question subject to
26 metallurgical ultrasonic tests -- these of course take
27 a great deal -- take a lot of time and you don't have
28 those results until some time after. There were a number
29 of theories postulated as to what was taking place; a
30 poor quality of pipe, excessive pressure surges and that

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Cross-Exam by Evans

1 sort of thing, but mostly it was conjecture.

2 I might point out here, and
3 I'm reading just a few highlights from the Interprovincia
4 Report,

5 "The oil was contained within the natural boundaries
6 of a slough which was about 400 feet wide and 600
7 feet long."

8 Oil soaked ground and water contamination in the slough
9 area. They commented on the loss in throughput on the
10 main line. The pressure had dropped to 75 pounds from
11 their working pressure of something in the order of 6 or
12 800.

13 The line was down -- Edmonton
14 to Superior -- was down thirty and a quarter hours. The
15 loss in throughput, one million two hundred thousand
16 barrels. That last point, they have lots of ways and
17 means of making up that throughput so that the eastern
18 people don't freeze by getting into their stockpiled
19 resources, say at Superior.

20 One comment, they talk about a
21 weld here -- a weld had a crack running clockwise from the
22 nine to three position. This might be worth a comment
23 on the basis that the pipeline spill -- the amount of
24 oil out -- the amount of oil that's lost from a rupture
25 of this kind is to some degree dependent on the -- where
26 the block valves are placed -- the control valves. In
27 this case, the block valves were about 25 miles apart.
28 The amount of oil out, or lost, is also dependent on the
29 gradient of the pipeline. It's also dependent on the
30 position of the split and ^{when} they talk about a nine to three,

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Cross-Exam by Evans

1 nine o'clock to three o'clock quadrant, that is some-
2 what significant. You can visualize that at a twelve
3 o'clock position, with no great gradient on the line,
4 the split is right on top of the pipe. There won't be
5 that much oil lost. If you visualize that split at a
6 six o'clock position, the bottom of the pipe, then over
7 a certain distance, depending on gradient and head and
8 that sort of thing, most of the oil will run out of the
9 pipe.

10 The position of the split that
11 we looked at on the screen there a minute ago was in
12 the twelve o'clock to three o'clock position or quadrant.
13 So when the head had equalized in that section of pipe-
14 line with the block valves closed down, a certain volume
15 would run out. Then, during the repair of the pipe,
16 there is another quantity of oil as they cut through the
17 damaged portion. There's another volume of oil that will
18 drain out and this is referred to in many ways "drain-up"
19 and "drain-back", etc., and this is controlled spill,
20 you might say. Usually it is - they have prepared a
21 ditch or something like this, or a sump, into which it
22 is collected while they go ahead with the pipeline re-
23 pair.

24 Just to -- Just summarizing
25 some of the numbers in the volumes that this particular
26 spill -- really you can see that there were two spills,
27 one following the other in quick succession here. Then
28 I'll take a look at the reporting situation.

29 But these two spills -- There
30 was a total volume spilled -- a total volume out and that

1 will include a drain-back or drain-up was 37,000 barrels.
2 They recovered 36,000 barrels. Those figures only
3 evolved/after many, many weeks of investigation and that
4 sort of thing.

5 Unless there's any questions,
6 I think I've said enough about that spill; the volumes,
7 the specifics, the order^{of} magnitude of time. It seems to
8 me to be not worthwhile to go into the actual hours, the
9 day, all these specific details, but there's been many
10 reports written on it. Those are the highlights of what
11 can happen in a pipeline spill, and I think this would
12 be the time to look at one viewgraph that I have that,
13 in my opinion, is part of a contingency plan that any
14 pipeline company must have. It's, in a way, our own
15 version -- or my own version of the reporting system and
16 this, I think is automatic.

17 Could we -- If I could have the
18 lights out please. Just a brief description here of the
19 communication situation that would take place -- or that
20 does take place in the Interprovincial Pipeline System,
21 when something goes wrong. It's just a diagrammatic
22 representation of the flow of communication.

23 The red portion on the left,
24 of course, is a spill from a pipeline which is under
25 National Energy Board jurisdiction and that is the setup
26 in the Interprovincial and the Trans-Mountain Pipelines
27 and a few others in Canada. When a major event occurs,
28 a major split takes place, it is up to the pipeline
29 company to take the first immediate action. They're the
30 ones that first know of the spill and the pressure drops

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1 and they're immediately alerted, so their internal
2 reporting is the first thing that happens. Coming out
3 from that red area, I show internal company reporting
4 and response. This should be immediate and usually is
5 immediate. They get an immediate signal in their control
6 stations and all things, many things happen immediately.

7 Pipeline company management
8 is the first to know -- is the first to be advised or
9 receive the information of the -- of something that has
10 gone wrong. But at the same time, others are busy on
11 the phones and other means of communication to advise
12 other people that need to be brought into the situation.
13 So then, it's the external reporting of the spill which
14 takes place just as soon as possible and this would --
15 there would be communication from the pipeline company
16 to their pumping stations, to their supply depots.

17 They would, in this case that
18 I talked about, through their own aircraft -- or an airport
19 where they immediately go into a small plane and flew
20 the pipeline and to activate equipment -- equipment of
21 all kinds -- their pumping equipment, bulldozers and
22 so on -- extra joints of pipe -- and manpower to the
23 scene. So that's what I mean by "external reporting".

24 In the meantime, if it's a
25 significant event, there's a line that I've dropped down
26 from the pipeline company management and spokesman,
27 usually they have one man that does the public relations
28 bit and it is usually their decision to inform the press
29 and usually after some early assessment, this they do.
30 The external reporting in this particular case, which may

1 not be -- which may be similar to whatever evolves --
2 whatever kind of organizational setup and contingency
3 planning setup that might come from a company that builds
4 the Mackenzie Valley Pipeline. This may not be too
5 different.

6 The upper line here, we say
7 provincial and for the Mackenzie Valley line, it would
8 be a double line, as I see it. It would be both
9 provincial and Territorial. So the Northwest Territorial
10 Government would be notified. The Department of Indian
11 and Northern Affairs would be notified. Ottawa would
12 be notified. I think those would be the main ones. Out
13 of that type of information flow and communication, other
14 that need to be involved would be alerted. I thought that
15 -- that's all I have to say about that one, but it gives
16 an impression, I think of the communication.

17 Let me point out that I've
18 stated that, in my opinion, the contingency plan for
19 Interprovincial pipeline is a good one, at this stage.
20 It seems complete and maybe I could support that statement
21 by covering very, very quickly just the content to give
22 you an idea of the types of things that they consider
23 in a contingency plan. Their alert procedures, similar
24 to what I discuss there, they have a number of pages on
25 who to report to, who's involved in every phase of
26 response and response, containment, recovery, etc., what
27 to report, what levels of responsibility, public relations,
28 that's covered, contacts with local residents, the
29 media -- pretty well defined -- their own company personnel
30 with their organizational structure and the responsibilities

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1 currently define the on-scene-- predesignated on-scene
2 commander -- his name, and others, and their functions
3 and duties at times of an emergency-- the government
4 agencies, who to advise and what to report -- they cover
5 police assistants, because very often, in cases like
6 this, R.C.M.P. are required both sometimes for traffic
7 control and many other things and initial investigation
8 of cause -- overload highway permits, main block valves,
9 equipment and how it's to be used, where it's to be --
10 where it's stockpiled. They also have lists of the other
11 equipment that might be obtained in a major event from
12 other pipeline organizations or other industrial setup;
13 contractors, who they are, where they're located, the
14 telephone numbers and so on; towns and municipalities,
15 especially those municipalities through which the pipe-
16 line runs, rights-of-way; their phone numbers, who to
17 contact; where the airstrips are; telephone numbers;
18 power and gas companies, same thing.

19 There's an interesting tabulation
20 in their contingency plan which gives the volumes of --
21 in barrels -- oil per mile. An interesting ^{figure} to me is a
22 forty -eight inch diameter pipeline carries 11,000
23 barrels per mile. The company radio communication, maps,
24 pipeline gradient, etc.

25 Last thing I would say about --
26 in response to this question is the -- after the usual --
27 after the phases that we've talked about of alerting,
28 discovery, reporting and containment and countermeasures
29 I mentioned those briefly here and the clean-up and
30 disposal. Let me think, disposal -- most of this oil tha

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Cross-Exam by Evans

1 was recovered was pumped directly back into the pipeline,
2 after the pipeline had been repaired. The additional
3 water that they might have picked up with it, it's
4 only a very small part, this offers no problem. They tap
5 into the pipeline and pump the crude back in.

6 The disposal of the remaining
7 oil that was on the land and in and around the sloughs
8 and the depressions, this was left till spring and in
9 the spring, the company went back in with bulldozers
10 and other equipment. Any of the aerable land was -- as
11 a matter of fact, they contracted a few specialists in
12 this type of thing and aerated, turned over the land,
13 fertilized it; did a number of things to it that I'm a bit
14 unfamiliar with but one year later, that land that had
15 previously been growing crops -- one year later, the
16 crops were as good as they had been in the year prior
17 to the spill.

18 So that's a comment on disposal.
19 It's a comment on restoration. Now, payments of damages,
20 cleanup costs, and prosecution -- the company paid
21 whatever costs accrued and compensated the farmer on
22 which the oil had been spilled for loss of crop and
23 revenue. Naturally, they paid the cleanup costs and
24 that sort of thing and as far as prosecution is con-
25 cerned, this was considered by various authorities,
26 essentially wildlife because of damage to ducks, mainly,
27 at that time of the year. I forgot to say that I think
28 in this event, there were some thirty ducks that were
29 killed.

30 They looked at prosecution, and

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Cross-Exam by Evans

1 evaluated this possibility. The case did go to Court
2 and, as I recall, there was a fine in the order of --
3 it was nominal, I think -- a thousand dollars or some-
4 thing in that order. That's from memory, so it may not
5 be correct.

6 That's all I have to say
7 about that.

8 MR. MARSHALL: Mr. Commissioner, I
9 wonder if I could say a few words.

10 It's early Monday morning and I won't
11 say very much about relevancy, except that it seems to
12 me with all due respect to the witness that much of
13 what's been gone through for the last forty minutes isn't
14 relevant to the work of this Inquiry. But that's not
15 really the point that I wish to make. The point is that
16 it's about quarter after ten, we've been sitting since
17 9:30. We've had one question answered and I suggest to
18 Mr. Evans that if he wishes to call direct evidence, the
19 rules of the Inquiry require that it be prepared in
20 advance and circulated to the participants so that they
21 can have an opportunity to prepare cross-examination.

22 I think we've been around this
23 route before with other Counsel and really that's the
24 only way we can carry on the work of the Inquiry. If he
25 wants to cross-examine let him cross-examine. If he wants
26 to lead direct evidence, I suggest that he ought to
27 abide by the rule.

28 THE COMMISSIONER: That's a point
29 that was concerning me, too, Mr. Evans.

30 MR. EVANS: Yes, Mr. Commissioner,

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Cross-Exam by Evans

1 I understand your concern.

2 THE COMMISSIONER: -- Well
3 let me finish. Mr. Marshall's right in that you're
4 asking Mr. Pettigrew, who's an expert in these matters,
5 to discuss, at great length, particular spills and other
6 matters that weren't laid out even in brief in his
7 opening statement and that's not -- that's not his fault.
8 I just -- I think Mr. Marshall's got a point. You're
9 really -- this isn't cross-examination in the accepted
10 sense of the word and I'm not suggesting there's anything
11 wrong with doing that, but if you saw, for instance, the
12 same collaboration between Arctic Gas and Foothills in
13 the presentation of their case that we observing between
14 COPE and CARC, you'd be making the same objection. You
15 really would be and I think it's a point well made.

16 MR. EVANS: I appreciate that
17 point, Mr. Commissioner and I'll try to confine my
18 cross-examination to things that are more directly
19 relevant. However, I --

20 THE COMMISSIONER: It's not so
21 much a question of relevancy, it's that the -- it's an
22 elaboration of a matter that should have been outlined
23 in the prepared statement, that's all. Mr. -- I think
24 Mr. Marshall's entitled to complain about that.

25 MR. BAYLY: Mr. Commissioner,
26 before we go on with this, we have been through this
27 before and one of the things that you said before, sir,
28 was that this is not a trial and this is not a proceeding
29 where anyone has property in a witness and I certainly didn't
30 lock my witnesses up from anybody.

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Cross-Exam by Evans

1 THE COMMISSIONER: No, no.

2 Nothing wrong with that.

3 MR. BAYLY: -- and in the past,
4 it's also been the custom for the applicants as well as
5 others to approach the witnesses of COPE and CARC and
6 Commission Counsel and speak to them at coffee break
7 or in the evening in order to ask if they have any inform
8 ation on various subjects. I think we have to keep that
9 in mind when we're -- when we're looking at this prob-
10 lem.

11 THE COMMISSIONER: I want you
12 to do that. I want you all to feel free to talk with
13 each others witnesses and I hope you continue to do so.
14 Mr. Marshall isn't objecting to that. He's suggesting
15 that the matter that's being discussed by Mr. Pettigrew
16 is one that is appropriately included in a prepared
17 statement, circulated in advance. That's the point, as
18 I understand it and I certainly think there's something
19 in it. But don't get me wrong, you're all entitled to
20 talk to each others witnesses. I think you should. This
21 is -- the witnesses are anxious that the whole of the
22 evidence should come out and they should feel free to
23 talk to any of you. But I -- Well I think, carry on
24 Mr. Evans and, but bear in mind what I've said.

25 MR. GOUDGE: May I suggest, sir,
26 just before we conclude this that one practical way out
27 of this dilemma, and it is a dilemma, may be that when
28 Counsel who are cross-examining know that they wish to
29 go into in relatively expansive detail matters that
30 they feel are of use to you sir, and I'm -- Mr. Evans

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1 felt that and it seems to me that it was useful to you.
2 It would be helpful to the rest of us to other Counsel,
3 to be given some advance notice of that so that it avoids
4 Mr. Marshall's complaint that he is, in a sense, taken a
5 little by surprise at the expansiveness of the evidence
6 and he would then be -- at least as best one is able in
7 the circumstances -- to prepare his own questions about
8 the question asked by Mr. Evans or any other Counsel. So
9 it seems to me that if all Counsel are alert to the prob-
10 lem and if they do wish to elicit, in rather substantial
11 form, additional pieces of information from the witness,
12 that they make an effort to communicate that in advance
13 to other Counsel, so that other Counsel can prepare
14 questions on that aspect of the matter, as well as the
15 evidence in chief.

16 MR. HOLLINGWORTH: That, sir,
17 seems to me gets into two levels of discovery of document
18 We've got your preliminary rulings which say that evidence
19 should be presented in written form and distributed two
20 weeks in advance and it seems to me Mr. Goudge is now
21 suggesting some contracted form of that and I don't re-
22 gard that as satisfactory. It seems to me if any Counsel
23 whether it be Mr. Evans, or anyone else wants to get into
24 matters of substance in cross-examination which aren't
25 really related to the direct evidence, that he ought to
26 call that witness again, and distribute the evidence in
27 advance.

28 THE COMMISSIONER: Yes. That's
29 a good point. That puts it very well. Well, carry on
30 Mr. Evans and let's just see how we get along.

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Cross-Exam by Evans

1 MR. EVANS: I just want to make
2 one point on this. Now, it was my feeling that, in a
3 way, this was directly related to his evidence in chief
4 and that it's a specific example of many of the things
5 he's been talking about.

6 THE COMMISSIONER: It is directly
7 to that. All right, I agree with that.

8 MR. EVANS: I just thought it
9 would be, you know, would bring it -- focus the point
10 for you if he could discuss a situation in the past
11 in which he had firsthand knowledge.

12 THE COMMISSIONER: Right. No,
13 it was helpful. We're not -- no one's critical of Mr.
14 Pettigrew and no one's saying this evidence shouldn't
15 have been heard. It's the procedure and we, as lawyers,
16 are -- you know -- that's our meat and drink to us --
17 procedure.

18 WITNESS PETTIGREW: I'd like to
19 say one thing. I didn't realize I was being that expansive,
20 I got the reading that some detail was required and if
21 at any time, I tend to talk a little bit too much on any
22 one of the other, upcoming questions, please remind me
23 and I'll try to keep it as short as possible.

24 THE COMMISSIONER: Well, that's
25 fine, don't worry about that. It's nothing --

26 MR. HOLLINGWORTH: We always
27 start the week with a fight, Mr. Pettigrew.

28 THE COMMISSIONER: Okay, let's
29 carry on.

30 MR. EVANS: Moving right along

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Cross-Exam by Evans

1 here -- I'll address my next question to Mr. Logan. I
2 wonder, sir, if it's possible to generalize on the de-
3 gree of success that is being achieved in cleanup of
4 major oil spills in aquatic environments. I wonder if
5 you could give us some idea how successful --

6 WITNESS LOGAN: Well --

7 Q Maybe I could put it
8 another way for you. Suppose you use a scale of zero
9 to ten and the zero representing complete failure and
10 ten representing a high degree of success, maybe you
11 could rate the past performances in aquatic environments
12 -- cleaning up oil spills.

13 A Well, I have to divide
14 that, if I may, into a couple of areas. Very quiet
15 aquatic environments; small creeks, a reasonable degree
16 of success. Using your scale of zero to ten, probably
17 somewhere in the area of five to seven and a half. Major
18 aquatic systems such as large rivers, lakes, open oceans,
19 we're back down about one. The success rate has been
20 very poor.

21 Q So that would be the
22 success rate you'd foresee in the Mackenzie River or
23 the Beaufort Sea?

24 A Possibly.

25 Q I wonder if the other
26 gentlemen on the panel would like to comment on that
27 question?

28 WITNESS PETTIGREW: My comment
29 would be that it would be in the order of magnitude that
30 certainly isn't halfway on that zero to ten scale.

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1 The one to two would be about top limit.

2 Q I'm sorry, Mr. Pettigrew
3 I'm not sure that I understood that. You said -- you
4 mean quiet --

5 A I'm agreeing with Mr.
6 Logan's evaluation on the scale from zero to ten. I'd
7 say the success ratio was down at that lower level.

8 Q Around one?

9 A Not much more.

10 Q Now -- you'd agree with
11 him with respect to quiet aquatic environments, like
12 small creeks, around five?

13 A Yes.

14 Q O.K., Mr. Snow, Dr. Snow?

15 WITNESS SNOW: Yes, I think
16 right down at the bottom end as far as most of the
17 Mackenzie system is concerned. Probably one would be a
18 fairly good estimate, but there are quiet areas in the
19 Mackenzie system too, where containment and cleanup
20 probably could be relatively more effective, probably
21 approaching four.

22 Q Now, in a length of
23 oil pipelines, say two thousand miles, what do you
24 suppose the probability of an oil spill in one year
25 would be, under present -- the present degree of
26 sophistication in pipeline technology?

27 MR. HOLLINGWORTH: Is Mr.
28 Evans referring to a break in the pipeline or is he
29 referring to spill along the right-of-way? I wonder if
30 he could be more specific.

Snow, Logan, Pettigrew
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1 MR. EVANS: I was referring to
2 a break.

3 MR. MARSHALL: Well sir, that's
4 a subject that I know a little bit about and it requires
5 a lot more detailed question. You have to talk about
6 size, you have to talk about pressure, you have to talk
7 about operating conditions, locations and so on. The
8 statistics are meaningless unless you have a lot more
9 detail in the question, for the answer.

10 MR. GOUDGE: Mr. Commissioner,
11 if Mr. Marshall wants to give evidence, let him get up
12 there. Why doesn't -- In my respectful submission, the
13 the witness ought to be permitted at least a preliminary
14 run at the answer. If he says there are qualifications
15 that need to put in the question, that's quite a
16 different thing.

17 MR. MARSHALL: I'm saying there
18 not enough definition to the question, I will withdraw
19 my evidence.

20 THE COMMISSIONER: The -- I would
21 -- the witness has been alerted to Mr. Marshall's point
22 which seems sound enough. It's a matter that might be
23 useful to have the witness answer and when the Beaufort
24 Delta group present their evidence, they can indicate
25 whether they agree with it or disagree with it. I under-
26 stood the Beaufort Delta group was presenting evidence
27 on impact of an oil pipeline rather than the two pipeline
28 companies doing it.

29 MR. GOUDGE: Well, we hope to
30 have some evidence from them as well too, sir.

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1 THE COMMISSIONER: All right.

2 I've forgotten who the question was asked of, but --

3 MR. EVANS: I haven't actually
4 directed it but, I guess Mr. Pettigrew and Mr. Logan,
5 in taking Mr. Marshall's comments into consideration,
6 maybe you can qualify your answer by stating the assump-
7 tions you're making.

8 WITNESS PETTIGREW: I'll try to
9 say it in my own way. I would hesitate to put a probabil-
10 ity factor on that sort of thing. I don't pretend to be
11 that kind of an expert anyway in the business of pipe-
12 lining, but I would like to put it in a different frame--
13 a different. Let me say it this way, that in Canada
14 over a period of a year, pipelines have given us most of
15 our volume problems of spilled oil, pipelines of all
16 sizes, from the thirty-four inch that I talked about to
17 small pipelines in oil fields, particularly in Alberta.
18 It runs somewhere on the average between oh, probably
19 around thirty-five or forty percent of the volume
20 spilled in a given year is due to pipeline failure. So
21 that's a pretty high percentage. If I had to support
22 that, I have one slide that would give some indication
23 on a national scene of the number of pipeline events
24 and the volumes associated with that. That's about all
25 that I would comment on.

26 Q Did you have anything to
27 add to that Mr. Logan?

28 WITNESS LOGAN: No.

29 THE COMMISSIONER: Well I should
30 not think that there's anyone likely to dispute what Mr.

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Cross-Exam by Evans

1 Pettigrew has just said. I'd be surprised if it were a
2 matter of dispute. I think we can pass on.

3 Q O.K. Now, I have before
4 me volume two of Dome Petroleum's application for a
5 drilling authority. It contains an oil spill contingency
6 plan. Now, I'm not quite sure what I -- what procedure
7 I should use here. I'd like to at least list this as a
8 document that's available for examination.

9 THE COMMISSIONER: It is done
10 then.

11 Q I believe you gentlemen
12 have examined this, have you? Mr. Pettigrew?

13 WITNESS PETTIGREW: I didn't
14 hear which one you're referring to.

15 Q Of the oil spill contingency
16 plan of Dome Petroleum. I guess it's Canmar now. Have
17 you examined that?

18 A I've examined it very
19 briefly. I've not had time to go through it, but I
20 know something of its content and -- if that answers
21 your question.

22 Q Dr. Snow?

23 WITNESS SNOW: Yes, I have
24 examined it.

25 Q Mr. Logan?

26 WITNESS LOGAN: No I have not
27 seen the latest issue.

28 Q You've seen a previous
29 draft I take it?

30 A I saw a draft that came out

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1 in December.

2 Q I see. O.K., thank you.

3 Now, in chapter one in pages one to three it stated
4 there the results of the Beaufort Sea studies suggest a
5 number of oil spill cleanup techniques which are likely
6 to be effective for oil spills under the sea ice, Canmar's
7 drilling location. It states that:

8 "There are some uncertainties associated with the
9 techniques".

10 In summarizing a capability, it ends in a very positive
11 note.

12 "Canmar contends that its environmental contingency
13 plan will go a long way to minimize the detrimental
14 effects of an oil spill should it occur in the
15 Beaufort Sea from Canmar's operations."

16 Now, Dr. Milne who gave testimony here last week, appears
17 to state quite a different case. On page 24 of his pre-
18 pared testimony, he states:

19 "Most of the oil discharged from October, 1976 to
20 early July 1977 --"

21 That was in his scenario of possible oil spills --

22 "will escape containment and disposal at both
23 Canmar sites. 25,000 cubic meters of oil discharged
24 from October, 1976 to early July, 1977 will escape
25 containment and disposal at both Canmar sites.

26 Spring burning will have only very limited success."

27 Further down on the same page it states that:

28 "Oil spill counter measures proposed for 1977 are
29 not likely to decrease significantly the estimates
30 of environmental impact of an oil and gas blowout

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1 occurring at either Canmar site."

2 Now, significantly both of these statements are based
3 on the same body of data, that's the Beaufort Sea Project.
4 I understand that Mr. Logan participated extensively in
5 that. Now --

6 THE COMMISSIONER: Excuse me,
7 you're saying that Canmar's assertion is based on the
8 Beaufort Sea study?

9 MR. EVANS: Yes, Mr. Commissioner
10 that appears to be the basis for their evaluation. Now,
11 I wonder, Mr. Logan, would you agree that these two
12 statements are diametrically opposed as to cleanup
13 capability?

14 THE COMMISSIONER: Well, let's
15 just pause a minute here. We all heard Dr. Milne and
16 that was a most impressive presentation. You -- and
17 I'm sure Mr. Logan is familiar with Dr. Milne's report,
18 if he was a member of the study group, Canmar is in its
19 whatever that is -- its report, quite naturally suggests
20 that everything's going to be all right and that they
21 have cleanup capability that will minimize the results
22 of an oil spill. You're asking Mr. Logan whether he
23 agrees with Canmar or with Dr. Milne, is that ?

24 MR. EVANS: Well that's the
25 next question I was going to ask him after he had --
26 if he agrees with me that these are very differing
27 evaluations of the same data.

28 THE COMMISSIONER: Well, let's
29 -- we all can make up our mind about that. On the face
30 of it, there seems to be a difference.

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1 MR. EVANS: Yes.

2 THE COMMISSIONER: So that
3 what you've come down to is you're asking someone who's
4 working apparently under Dr. Milne's direction if he
5 agrees with the report Dr. Milne prepared on the basis
6 of work Mr. Logan and others did.

7 MR. EVANS: Are you suggesting
8 a conflict of interest, Mr. Commissioner?

9 THE COMMISSIONER: No, I'm not
10 but I don't think this is going to get us very far.

11 MR. EVANS: Well, maybe I would
12 address the question to Dr. Snow. He didn't take any
13 part in the study, and he also is --

14 THE COMMISSIONER: Well then,
15 he didn't take any part in the study and hasn't assessed
16 Canmar's capacity to clean up an oil spill in the Beau-
17 fort Sea, what's -- with great respect to Dr. Snow --
18 what good is his opinion to us? Maybe we ought to have
19 it on the subject.

20 MR. EVANS: Well I think Dr.
21 Snow did some independent work in the --

22 MR. BAYLY: Nobody's asked him
23 whether he did assess it or not, perhaps that should be
24 done first.

25 MR. EVANS: I think that's the
26 approach we should take. Could you give us a statement
27 on that Dr. Snow? First of all as to whether you've
28 assessed the report and --

29 WITNESS SNOW: Yes, I and my
30 colleagues did, in fact, go over this document some time

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1 ago and we did prepare some detailed comments by way of
2 a critique.

3 THE COMMISSIONER: Excuse me.
4 You and your colleagues, being with, as I recollect, the
5 Department of --

6 A Indian Northern Affairs.

7 Q You're with the Environment
8 Division, that's what confused me.

9 A That's right, yes.

10 MR. EVANS: What was your
11 capacity, what was your office that you held at the time
12 you did this evaluation?

13 A I was the aquatic biologist
14 in the Environmental Assessment Section of the Environment
15 Division.

16 THE COMMISSIONER: Well, I think
17 that this is a critique of the Milne report by Indian
18 Affairs and Northern Affairs and I think that we should
19 have it, but I don't want to -- at least by persons
20 working within that department. I think we should have
21 it before us, but I pause to allow Mr. Marshall and Mr.
22 Hollingworth to indicate their views on the matter.

23 MR. BAYLY: Mr. Commissioner,
24 I'm not quite sure that is what Dr. Snow said. I thought
25 that he said that he'd assessed the contingency plan
26 for the Government.

27 THE COMMISSIONER: Is that right

28 A That's correct, yes.

29 MR. GOUDGE: It's a critique
30 of Canmar, I take it Dr. Snow, not a critique of Mr. Milne

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1 A Yes. This is not -- this
2 an
3 was not official document. It's not a report. It was
4 done internally, primarily as backup for an evaluation
5 of the Milne and Smiley report; the Preliminary Environ-
6 mental Assessment for the Beaufort Sea. Although we
7 looked at the whole Dome/Canmar proposal, we concentrated
8 our attention primarily on, I believe it's Section Eight,
9 which is the contingency plan. But this was not a
10 critique for distribution. It was basically an internal
11 exercise.

12 THE COMMISSIONER: Are we at
13 liberty to hear what it -- the assessments of it, Dr.
14 Snow? Or do you have any reservations about indicating
15 to us the view you expressed?

16 A No. In very broad terms,
17 I can go into the details, yes.

18 Q Well, go ahead then.

19 A First of all, I think that
20 Dome/Canmar should probably be complimented on putting
21 together a very comprehensive oil spill contingency
22 plan, certainly one of the most detailed I've had the
23 benefit of seeing. They've put together all of the
24 procedures and currently available technology which
25 exists for containment and cleanup, hopefully, under
26 Arctic conditions. The main concern that I have, is that
27 the equipment and technology currently available has
28 never been tested to determine any kind of efficiency
29 in the ice infested condition pertaining in the southern
30 Beaufort Sea. So therefore, we're largely in the realm
 of untried technology and a contingency plan is only as

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1 good as the efficiency of its component parts.

2 MR. EVANS: Dr. Snow, did you
3 wish to state whether or not you agreed with Mr. Milne's
4 evaluation of their contingency plan.

5 A Yes, I do. I think the
6 Preliminary Environmental Impact Assessment produced by
7 Dr. Milne and Mr. Smiley, is a responsible document and
8 probably reflects more closely the situation that we
9 would see in the Beaufort Sea if there were to be an
10 uncontrolled wellhead blowout.

11 Q I wonder if you can give
12 us some perspective by discussing the countermeasures
13 which might be applied to cleanup oil, say in mid-winter
14 and, after that, mid-summer and during the spring breakup.
15 I address that question to all three of the gentlemen on
16 the panel, I think, in particular, Mr. Logan.

17 THE COMMISSIONER: Didn't Dr.
18 Milne deal with each of those situations?

19 MR. EVANS: I'm not sure, Mr.
20 Commissioner, I thought he hadn't dealt specifically
21 with them.

22 THE COMMISSIONER: Well, he
23 dealt with fall, winter, spring and summer, in that order,
24 postulating a blowout in the fall, at the end of the
25 drilling season.

26 MR. EVANS: I believe that Mr.
27 Milne dealt with the impact and what I'm asking these
28 gentlemen to discuss is the countermeasures, the techniques
29 involved. I think, as pointed out on Saturday, Mr. Logan
30 is somewhat of an expert in this area. He's in the

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1 research and development area, and he might be able to
2 give us an idea of what equipment is available, etc.

3 THE COMMISSIONER: Would you
4 comment on that then, Mr. Logan?

5 WITNESS LOGAN: Certainly. Well,
6 in the summer in open water condition, the conventional
7 equipment used in more temperate regions can be employed.
8 This equipment is very restrictive in its application
9 in that we're limited to waves no greater than about three
10 feet and winds of no greater than 15 knots. If the
11 wind and wave conditions are beyond that, the efficiency
12 of the equipment drops off very dramatically to inefficiency.
13 Mr. Milne, in the Beaufort Sea Assessment has given
14 some indication of the wind conditions and wave conditions
15 which could be expected in the summertime. Provided
16 there is basically no more than ten percent ice intru-
17 sions in open water, this equipment can function with
18 all its inherent disadvantages, but when we have ice
19 cover, there's basically no way of removing oil from
20 under ice except in the landfast ice area where we can
21 possibly burn it in the spring. In the shear zones and the
22 polar packs, nothing is available.

23 Q Well the Canmar Contingency
24 Plan seems to be based on the assumption that it would
25 be feasible to use certain methods and I'm not sure
26 that these methods are tested. Specifically, I think
27 they depend almost totally on burning the oil if it's
28 spilled during the winter. I wonder if you'd agree with
29 that, that their methods are not being properly -- the
30 methods they have hypothesized have not been properly

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1 tested?

2 THE COMMISSIONER: Well, that
3 is the point Dr. Snow made just a moment ago.

4 MR. EVANS: Yes, I suppose it
5 is, Mr. Commissioner. Maybe Mr. Logan could comment on
6 the feasibility of burning the oil in the ice.

7 A The feasibility of burning
8 oil on the ice?

9 Q Yes, assuming that it is
10 a spill from under the ice. I believe that they propose
11 to deal with this totally by burning the oil after it
12 comes to the surface of the ice. I wonder if you could
13 comment on that?

14 A In the landfast ice zones
15 in the Beaufort Sea, oil will migrate to the surface
16 in the springtime where it can be burnt. The experimenta-
17 tion done under the Beaufort Sea "G" Series projects,
18 did this quite successfully at Balaena Bay last winter.

19 THE COMMISSIONER: There was
20 one inconsistency in the evidence that I thought maybe you'd
21 comment on it, Mr. Logan. We were told by Dr. Percy or
22 Dr. Grainger -- one or the other -- that oil didn't
23 weather when it was trapped under the ice over the
24 winter. That meant that it retained its toxic properties
25 which is bad but I thought it meant that if it was not
26 weathered when it appeared on the surface in the spring,
27 it could be burned off, which is good, presumably. Now
28 Dr. Milne notwithstanding that, said that you could
29 only burn off about half of it and maybe I missed some-
30 thing there, but I don't quite follow him.

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1 A Well, Mr. Commissioner,
2 up to when you brought in Mr. Milne's testimony, this was
3 quite true. Once the oil's entrained in the ice by freezing,
4 the -- it remains in the state in which it was entrained.
5 In other words the volatile components or the lighter
6 fractions of the oil are retained. Now, if this was
7 exposed to the open atmosphere, they would be off in a
8 matter of hours. In the spring when the oil does migrate
9 up through the brine channels and reaches the melt pools,
10 basically, its natural state as it was first put down.
11 There, it is subjected to weathering once on reaches the
12 melt pools. So, if you want to burn it, you have to get
13 right on it, in a matter of maybe twenty-four hours.
14 But oil on open water, spilled on open water is subject
15 immediately to weathering and your success in burning is
16 directly proportional to time which you have -- the time
17 between its spilling on the water and the time you get
18 to it. In other words, you arrive twenty-four hours
19 later, your success in burning is rather limited.

20 THE COMMISSIONER: I see. I
21 see the point.

22 MR. EVANS: Now, Dr. Snow, with
23 respect to your prepared testimony at page 16 you dis-
24 cussed concern over the fact that a blowout of a well
25 which resulted in the eruption of crude oil and gas
26 might be more difficult to burn than one in which only
27 crude oil was involved. I wonder if you could comment
28 on that because I think the general understanding was
29 the opposite case. In other words, that if there was
30 gas present it would make the oil easier to burn. I

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1 wonder if you could state how you arrived at the con-
2 clusion stated in your paper.

3 WITNESS SNOW: Yes, this is
4 with respect to the potential emulsification. The
5 most efficient means of disposing of spilled oil current-
6 ly is by burning. That is probably the lynch pin of
7 the Dome-Canmar plan and was also underlined in the
8 Beaufort Sea Summary. If there were an uncontrolled
9 wellhead blowout, then vast volumes ^{of} gas expanding as it
10 got to the surface would be released along with the oil
11 and there would be a certain amount of water formation
12 released with the oil as well and in the 80 or 180
13 feet, planned depths of the two sites, there'd be an
14 increase in the amount of vertical circulation associated
15 with this upward movement of gas and oil. This, I would
16 expect to continue as long as the blowout continued.
17 To me, there's a lot of kinetic energy there, which
18 exactly the conditions that you'd require to produce
19 an oil and water emulsion.

20 It should go without saying
21 that if there is -- if there are large amounts of water
22 associated with oil in emulsified form, then it is
23 impossible to ignite oil in this condition. That was
24 the concern that I had. That was the rationale upon which
25 I based it.

26 Q O.K. I wonder if you could
27 provide any information about what might happen to the
28 natural gas component which is not bound up with the
29 oil in emulsion. Would it burn, or is it possible that
30 it would be released into the air unburned? Specifically,

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1 I think Mr. Milne discussed the possibility of moving
2 ice snuffing out the fire, covering up the hole and then
3 opening again.

4 A From what I know of other
5 similar blowouts, I see no reason why the gas would not
6 be expected to ignite at the surface, even under Arctic
7 conditions. The -- I think the problem referred to by,
8 in the Beaufort Sea Summary was that once the oil and
9 gas mixture -- sorry, either the gas ^{was} burning or if oil
10 were successful in being burnt at the surface, this may
11 be snuffed out by floes drifting across the site and I think
12 this is quite possible, particularly in the light of the
13 evidence which the Beaufort Sea Summary shows in graphic
14 form in the -- from the land set imagery of that area.

15 Q Now, the problem that I'm
16 concerned about is the possibility that a gas and fumes
17 from the burning could become trapped in an inversion, is
18 that a possibility?

19 A I'm sorry, could you say
20 that again, please?

21 Q Well, a possibility that --
22 I understand -- it's my information that there's a heat
23 inversion over the Beaufort Sea. Now, is it possible
24 that escaping gas and/or fumes from burning of the
25 oil could become trapped in that inversion?

26 MR HOLLINGWORTH: Shouldn't he
27 ask the witness if he agrees that there's an inversion
28 over the Beaufort Sea first, Mr. Commissioner?

29 MR. EVANS: Well, he nodded his
30 head, and I assumed that he meant he was agreeing with me.

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1 MR. HOLLINGWORTH: Well, that
2 isn't on the transcript.

3 MR. EVANS: Well, do you agree
4 then that there's an inversion over the Beaufort Sea?

5 A There is a possibility
6 for such a condition to exist and I believe that inver-
7 sions do exist, yes. I also agree that there is a
8 possibility that gases or fumes from burning or ignition
9 could become trapped underneath that inversion.

10 MR. EVANS: Mr. Commissioner,
11 I suppose that somewhere along here, we're going to break
12 for coffee. This would be an appropriate time for me,
13 if it would be for you.

14 THE COMMISSIONER: Right.

15 (PROCEEDINGS ADJOURNED AT 11:00 A.M.)
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30

1 (PROCEEDINGS RESUMED AT 11:15 A.M.)

2
3 Q Dr. Snow, when we broke
4 for coffee I was discussing with you the escape of gas
5 and also smoke into the atmosphere , and the possibility
6 that this would be trapped in an inversion. Now , could
7 you deal specifically with the possibility of gas escap-
8 ing. What I'm interested in is if it's possible if gas
9 could excape, be trapped in the inversion and whether thi
10 would result in a risk of an explosion.

11 WITNESS SNOW: Do you mean,
12 when the gas is sort of laying, as a layer immediately
13 beneath the inversion ?

14 Q Yes, that's right.

15 A Well I imagine-- it's a
16 combustible substance-- I imagine there is a risk of ex-
17 plosion, yes. I don't quite know what would cause it.

18 Q This is a possibility, though,
19 of gas laying under the inversion.

20 A Yes, as long as the gas is
21 there, I imagine that it is.

22 Q O.K. Now, with respect to
23 the smoke, the Canmar Contingency Plan calls for burning
24 of large amounts of this oil. Would that cause a large
25 amount of smoke to be released ?

26 A Yes, very large amounts.

27 Q And I take from your prev-
28 ious answer that it's possible that this would be trapped
29 under the heat inversion.

30 A Yes, that's correct.

1 Q Now, have you considered
2 the possible effects of-- has your group considered the
3 possible effects of such an occurrence ?

4 A Yes, we did make a note tha
5 that was one of the potential impact areas. Our main con-
6 cern would have been the coastline immediately adjacent
7 to the Dome-Canmar sites.

8 Q Could this result in signif-
9 icant pollution of that area ?

10 A There is a possibility that
11 if there was a large amount of soot associated with the
12 smoke, that if this were to come down later on in the
13 form of precipitation on this area, that it could be contam-
14 inated in this way, yes.

15 Q Did you reach any conclusio
16 about whether or not this could be contaminating habitat
17 of the wildlife, particular snow goose feeding habitat or
18 Reindeer caribou range ?

19 A That was the point of view
20 that we were looking at, yes.

21 Q And what was your conclusion?

22 A There is a possibility to
23 pollute that habitat.

24 Q Do you think this is an area
25 that should be looked into further ?

26 A Yes, yes I would.

27 Q Now Mr. Pettigrew, in your
28 prepared testimony, page 16, you referred to the use of
29 dispersants. I wonder if you could review the salient
30 points of the restrictive guidelines; you referred to in

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1 your testimony.

2 WITNESS PETTIGREW: I would
3 like to turn that question over to Mr. Logan. He's more
4 prepared on it.

5
6 WITNESS LOGAN: I have a
7 synopsis. Can I present this or read it out.

8 THE COMMISSIONER: Well, why
9 don't you start and we'll see what happens.

10 MR. HOLLINGWORTH: Sir, I was
11 going to ask the same question so I don't think I'll pro-
12 test.

13 A It's two and a half pages.
14 This is taken from the Environment Canada's guidelines in
15 the use and acceptability of oil spill dispersants, and
16 the heading General Requirements, (A) Except in the case of
17 extreme emergencies, as noted below, chemical dispersants
18 shall be used only with the expressed permission of Environ-
19 nment Canada or Provincial authorities who are administer-
20 ing section 33 of the Fisheries Act. Furthermore, in view
21 of various provincial legislations, the use of dispersants
22 is also subject to the requirements of the provinces con-
23 cerned. Chemical dispersants can then be used upon, under
24 confident direction and in accordance with recommended
25 techniques.

26 (B) The on-scene commander, in con-
27 sultation with the appropriate agencies, will determine
28 the priorities of protection in each spill incident, and
29 the use of dispersants as subject to these priorities.

30 (C) Only dispersants that satisfy the

1 acceptability criteria as set forth in these guidelines
2 shall be used.

3 (D) All uses of chemical disper-
4 sants must be formally documented, as outlined in these
5 guidelines.

6 Restrictions on the use of disper-
7 sants- The use of dispersants will usually be avoided. (A)
8 in any waters containing major fish populations, or large
9 breeding or migration areas for species of fish or other
10 aquatic life, which may be damaged or reduced to market
11 value by exposure to dispersants, and, or dispersed oil.

12 (B) In any waters such use may significantly affect surface
13 water supplies. (C) Where eventual dilution of the disper-
14 sed oil is limited either because the water is quiescent
15 or because the water volume is small relative to spill
16 size. (D) On oils that have been deposited on sandy beaches
17 or on shorelines with important flora and fauna, (E) Under
18 conditions where the dispersant is ineffective as determined
19 by the effectiveness test described in these guidelines or
20 in judgement of the on-scene commander.

21 Possible conditions for the
22 use of dispersants- Dispersants that satisfy the accept-
23 ability criteria may be considered for use (A) when their
24 use will prevent or reduce hazard to human life or limb
25 or substantial hazard of fire to property. Caution is
26 advised in ^{the} case of spills of volatile oils where both the
27 application of the dispersant and the subsequent agitation
28 maybe increased fire hazards. Furthermore, it should rea-
29 lize that in spills of volatile oils, example number one
30 to number four fuel oils, natural agitation by wind, wave

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1 and currents may rapidly disperse the oil, (B) when their
2 use will prevent or substantially reduce hazard to a
3 significant population of water fowl or marine mammals,
4 (C) when their use will prevent or substantially reduce
5 significant damage to valuable property, excepting conditions,
6 (1) where such as restricted is noted in 1,2 above, which
7 is the restrictions in use, and (2) where other methods
8 for controlling and removing oil are reasonably effective

9 Q Is there any possibility
10 that large quantities of dispersants would be used in
11 counter measures employed to handle an oil spill in the
12 Beaufort Sea ?

13 A There is a possibility that
14 they would have to be considered for use.

15 THE COMMISSIONER: But all the
16 thinking is opposed to its being used at the moment isn't
17 it ?

18 A The majority of thinking,
19 yes, but not all.

20 MR. EVANS:

21 Q Has Canmar proposed that,
22 do you know ?

23 A Informally. They've talked about it

24 Q Now what would that in-
25 volve ? What procedures would they have to carry out in
26 order to use it ?

27 A In the event of an oil spill
28 the procedures would be that you've exhausted all other
29 mechanisms of controlling and cleaning up the oil, and
30 you would have to consult with the local Fisheries and

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1 Wildlife officers of both the Territorial government,
2 probably both Territorial governments, the Department of
3 Indian and Northern Affairs, Ministry of Transport, and
4 Department of the Environment and there would have to be
5 a consensus that dispersants are basically the last resort

6 Q How much dispersant would
7 you have to use to neutralize a gallon of--

8 THE COMMISSIONER: Excuse me,
9 you said, what would be the last resort ?

10 A When you've exhausted all
11 other methods of cleaning up the oil, it is a last resort
12 method. Dispersants.

13 THE COMMISSIONER: Yes, I
14 thought you said fisheries, not dispersants. All right,
15 carry on.

16 MR. EVANS:

17 Q What I was interested in
18 actually is how much dispersant do you have to use per
19 gallon of oil under these conditions ?

20 A In actual practice, it's
21 basically , you have to use between half a gallon and a
22 gallon of dispersant to clean up a gallon of oil.

23 Q Would the cold temperatures
24 in the Beaufort Sea affect that ? Would it make it that
25 you'd have to use more dispersant ?

26 A That's an area which I can'
27 answer. It's an area which we are starting to look at now
28 What effects temperature have on dispersants.

29 Q So in other words, you don'
30 know. Your department doesn't yet know what effect temper

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1 ature would have.

2 A There are indications that
3 the effectiveness of dispersants lessens with decreasing
4 temperatures but I can't give you the exact numbers be-
5 cause it's just guessing right now.

6 Q So that would mean that you
7 would have to use more dispersant per gallon of oil.

8 A Possibly.

9 Q O.K. What compounds are used
10 in Canada? Which ones are allowed by your department ?

11 A There's only three. One is
12 called Oilsperse 43. One is called Corexit 8666, and
13 the other one is called Sugee 2.

14 Q Mr. Pettigrew, I believe in
15 your prepared testimony you referred to the possibility of
16 conducting a realistic fire drill or mock exercise in
17 dealing with an oil spill, and how feasible would it be
18 to conduct such an exercise ?

19 WITNESS PETTIGREW: Well, I'm
20 not just sure what you have in mind or what the limits are
21 that you place around such a question but I think mock
22 exercises are a valuable part of training for manpower to
23 learn how to use equipment and react to cleaning up of an
24 oil spill. I think these are practical applications. There's
25 been a number of them carried out by industry and a number
26 by government people. Mr. Logan has been heavily involved
27 in this column of mock exercises of clean up under various
28 conditions with various pieces of equipment. I think they're
29 feasible. We design them.

30 Q This would involve the com-

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1 pany's people as well as the government's people in the
2 area .

3 A There have been deployment
4 exercises, if you will, which are mock exercises, attend-
5 ed by both industry and governments. Yes, and individually
6 or separately, rather. These I think have been valuable
7 from a learning point of view. They haven't always given
8 the answers that we've anticipated but they're helpful.

9 Q I assume none of these have
10 been carried out in the delta area yet.

11 A Mr. Logan can probably an-
12 swer that one better than I can. There have been some--
13 the work going on, not necessarily exercises by definition
14 of mock exercise. Most of the ones that I know of, have
15 been carried out in southern parts of the country on
16 river systems and lakes and land.

17 Q Did you wish to add some-
18 thing Mr. Logan. No ?

19 WITNESS LOGAN: M Just that a
20 lot of the industries using oil have formed co-operatives
21 and periodically they do run through mock exercises to
22 train their people in equipment use and deployment
23 techniques, and where there is specific high risk area
24 such as the Sinclair River connecting Lake Huron to Lake
25 Erie , industry and government have been involved in
26 deployment exercises to find out what the equipment will
27 do and where they could attempt to contain oil.

28 Q Now these deployment
29 exercises , are they of large scale? I mean would they
30 be the same as the real thing , or is it just a portion,

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1 like, you know, a very small part of the force that would
2 be used.

3 A Normally they're a very small
4 part. It's to train the response team leaders. They in
5 turn can direct the labour that would be used in an actual
6 spill instant. In other words, they're familiar with their
7 equipment and techniques, so they can show their work
8 force in an actual spill what to do.

9 Q Now Mr. Logan, I wonder
10 could you-- would it be possible to localize a spill in
11 the Beaufort Sea and direct it into a specific area to
12 be dealt with? Is that feasible?

13 A I don't think I can answer
14 that question. I'm not too familiar with the Beaufort
15 Sea environment. I think you'd have to direct that to
16 someone who is more familiar with the sites than I am.

17 Q How about elsewhere in
18 Canada, is this something that's done?

19 A Yes.

20 Q Directed into a cove or a
21 bay or something.

22 A Yes.

23 Q Mr. Pettigrew, I wonder,
24 you discussed briefly in your prepared testimony, the
25 NEEL's computer system. I wonder if you could elaborate
26 on it.

27 WITNESS PETTIGREW: The NEEL's
28 system. That's-- it stands for the National Environmental
29 al Emergency Locater System. In order to keep my time
30 down to something that's normal I'll read just two brief

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1 paragraphs.

2 Q I don't think that you--
3 that the Commissioner wants you to limit your comments
4 unduly.

5 THE COMMISSIONER: But we did
6 hear,-- I think before you went into the picture Mr. Evans
7 we did hear what NEELS was. We had other witnesses who
8 described that to us, as I recollect. That's the computer
9 that tells you where the slick lickers are around the
10 country, and so forth and so on. Isn't that what it is?

11 A Yes, yes.

12 MR. GOUDGE:

13 Q You have a pamphlet there
14 Mr. Pettigrew, I think, do you ? Perhaps you could simply
15 file that with us, sir.

16 MR. EVANS: Yes, that might be
17 a good idea if you could file it as an exhibit.

18 Q Well I'll ask a couple of
19 specific questions on this then and you can give fairly
20 short answers. How up to date is the information in the
21 computer ?

22 WITNESS PETTIGREW: For those
23 participants in the system, and this does not yet include
24 all of industry or some other agencies, it is quite up to
25 date. As changes take place in stock piling of equipment
26 it's a very simple and quick and easy matter to revise
27 upward or downward the total inventory at any one site.

28 Q Well, how long does this
29 take, ^a month, two months, a week on average before the
30 change shows up in the computer ?

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1 A The system is in a fairly
2 early phase of development. I can say all the participant
3 are not yet in. What is in there now-- if for instance
4 let me give you an example-- if for instance one of the
5 oil companies, Imperial Oil purchased additional equip-
6 ment and stock piled it in two or more places, the very
7 day that it was stock piled it's feasible and conceivable
8 that they would update their inventory and it's just a
9 matter of plugging it into a computer system. So this
10 doesn't take-- it isn't a matter of time. Quick and easy
11 up to date method--

12 Q Now, I believe you just
13 stated that it's a new system and not all of the equip-
14 ment in the country is yet in the computer. What percent-
15 age would you guess was in the computer ?

16 A I'd hate to put a percentag
17 on it. I would say it this way, that we anticipate a
18 number of other oil companies and agencies joining the
19 system and contributing their information, but in this
20 early phase there's mainly-- it's a government -- M.O.T.
21 equipment is in the system, a few oil companies, and that's
22 about where it is at this stage.

23 Q So there are a lot of people
24 that aren't in it yet .

25 A There are some yes.

26 Q O.K. now, on Saturday, you
27 showed us a graph and it showed threat, preparedness and
28 risk and you discussed various categories of preparedness,
29 contingency plan, trained personnel, equipment, and operat-
30 ional improvements. I wonder if you could give us some

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1 idea of what level we're at in each of these categories
2 in the north and in particular with respect to the
3 Beaufort Sea.

4 A Well, I think I said it in
5 my last statement as we looked at that graph that we are
6 not very far along the preparedness curve, and to break
7 it down into those categories, let me take one as an
8 example; Research and development on equipment, just think
9 of equipment. I think Mr. Logan, and I think some of my
10 other comments and Dr. Snow's comments support the fact
11 that there isn't the equipment that could adequately deal
12 with oil spills in that environment. It just doesn't seem
13 to exist in today's world. There's some equipment but I
14 think everyone accepts the fact that it's not very effective
15 under those conditions.

16 Q Well, maybe in line with
17 that I could address the next question to Mr. Logan. I
18 understand that you work in the research and development
19 area with respect to oil spills. Is that correct?

20 WITNESS LOGAN: That's correct.

21 Q What is being done to develop
22 new equipment to deal with the problems that are
23 particularly apparent in the north.

24 A Right now, very little.
25 There is some development work on a boom to withstand
26 ice impingement and there is some development work being
27 done on a piece of recovery equipment to make it of more
28 use in water-like ice infestation. When it comes to
29 heavy ice and solid ice cover there's nothing being done.

30 Q I see.. Now, I believe Canmar

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1 stated that they foresee the drilling program that will
2 extend for approximately 10 years in the Beaufort Sea. Do
3 you envision any breakthroughs in that period of time. Are
4 there programs that are planned, that haven't really got
5 off the ground yet ?

6 A Right now, we're in the area
7 of trying to define the problem, trying to get to come
8 to grips with what we're dealing with. We need far more
9 knowledge of the ice and ice conditions in the southern
10 Beaufort Sea, before we can start developing techniques
11 and equipment. I foresee it's going to be a fairly lengthy
12 time before anything can work effectively in that area.

13 Q So in other words you just
14 haven't got the basic information yet, to work from to-
15 wards developing new equipment.

16 A That's essentially correct.

17 Q Dr. Snow, I understand that
18 it's your job to assess the environmental assessment of
19 the gas plant proposals. Is that correct, For the
20 Department of Indian and Northern Affairs ?

21 WITNESS SNOW: I am a member
22 of ^{the} team which is assessing those applications, yes.

23 Q Now, is your assessment
24 limited to the three plants proposed, or do you consider
25 problems which might develop from the expansion of the
26 field?

27 A At the moment, attention is
28 limited solely to the material that's been made available
29 to us by the producer companies. As we are going to submit
30 this assessment to EARP process, ^{to} take into account the

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1 cumulative effect of all three developments, and in some
2 cases this would extend to possible future develop-
3 ments of the extensions of the gas fields.

4 Q Now, what happens in this
5 process, after your assessment? Where does it go?

6 A The proponent department is
7 Indian and Northern Affairs and guidelines have been
8 issued by D.O.E. , and by my own department for the pro-
9 duction preliminary environmental impact assessment. This
10 in fact we have done, and it was based on a tri-company
11 submission. Following that, when the companies forming
12 that Tri-company consortium Shell, Gulf and Imperial, then
13 went to individual submissions for a land tenure agree-
14 ment, and we are currently involved in writing the impact
15 statement associated with these individual submissions.
16 This is then, the impact statement prepared by the pro-
17 ponent department which goes to the Environmental Assess-
18 ment Review Panel.

19 Q Now, what stage are you
20 at in those-- I mean was there sufficient information in
21 those three applications for you to do an environmental
22 assessment?

23 A This is an ongoing process.
24 We are in the middle of the assessment right now. We have
25 requested additional information from two of the three
26 companies, Imperial and Gulf. The Shell document was the
27 latest of the three to be submitted and we are in the
28 process of the first going over of that document. It is
29 anticipated that we will be requesting additional infor-
30 mation of that company as well.

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1 Q So in other words, you've
2 given these companies deficiency statements. Is that
3 correct?

4 A We have indicated deficiencies in the
5 submissions of both Imperial and Gulf, yes.

6 Q I wonder if you could tell
7 us in what way they were deficient. I mean were they just
8 minor deficiencies or were there major gaps in information?

9 A It's not really possible for
10 me to answer that question at this time because it is an
11 ongoing process and some of the material has come in from
12 some of the companies and we're still waiting for others.
13 Maybe these deficiencies will be remedied when we get that
14 information.

15 Q Well, for instance did the
16 initial statement deal adequately with the effect on aquatic
17 life, on fish life?

18 A There is, one of the areas
19 we felt required more information was certain aspects of
20 fishery associated with the Taglu development, and Imperial
21 has indicated that they are providing ancillary information
22 on this subject to us.

23 Q Does that apply to Gulf and
24 Shell as well ?

25 A As I said, Shell, we are in the
26 very first work over of that document and we haven't prepared
27 a deficiency statement for that company yet. Gulf
28 is in a slightly different position. They have other
29 deficiencies, some of those do include fisheries work,
30 and again Gulf have indicated they are going to be under-

1 taking the appropriate studies and they will be providing
2 us with that information, as and when it becomes available.

3 Q Now, with respect to the
4 Taglu application, I believe in his testimony Dr. Lewis
5 stated, that it was north of the driftwood line. Do you
6 know if that's true?

7 A Yes that's true.

8 Q So, it's subject to flood-
9 ing.

10 A Indeed it is.

11 Q Is that why you are partic-
12 ularly concerned with the fish in that area?

13 A That is one of the concerns.
14 What you're actually indicating here, though are addition-
15 al information on hydrologic aspects of the area and this
16 is another piece of information which Imperial has under-
17 taken to provide us with.

18 Q Now, I'm a little confused
19 about that statement. Do you mean how often it's flooded?
20 Is that what you're-- you said hydrological information.

21 A Yes, these are just basic
22 hydrologic measurements of the channels which are liable
23 to be affected by that particular development, and also
24 the lakes on land in the vicinity. It would include things
25 such as the frequency of flooding and the depth to which
26 flood levels normally raise.

27 Q Do you have any information
28 on that at this time? How often a site would be flooded?

29 A We do have some information
30 but-some information is available both from Imperial

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1 through their Slaney consultant volumes, and also some from
4 environment Canada work that's been done in the area.

3 Q Well, how often would you
4 expect it to be flooded? Could you give us an estimate?

5 A I can't remember the exact
6 figures. There are records going back about 10 years of
7 the incidents of storm surges, which would produce floods,
8 I believe about 3 meters, and in one year there were
9 7 such raises, but I can't remember which year that was.

10 Q That was a high year though,
11 I would imagine.

12 A I beg your pardon.

13 Q That would be a higher than
14 average year, seven.

15 A Yes, that is-a--

16 Q Would two or three times a
17 year be a reasonable estimate?

18 A I think that would be an
19 average over the period for which we have a record, yes.

20 Q Now, I understand that the
21 plant is to be air-cooled. Has your assessment team de-
22 termined whether or not water will be used as a coolant
23 for smaller equipment?

24 A If I recall this really only
25 applies to the Taglu facility.

26 Q Yes, that's what I'm spec-
27 ifically referring to, Taglu.

28 A Yes, I believe in that sub-
29 mission document, Imperial indicates that they may need
30 to utilize some cooling water from the adjacent channel,

1 either Harry or Kuluarpak to cool down their equipment.

2 Q How do they plan to deal
3 with that, in disposing of the water afterwards?

4 A According to their applicat
5 ion to suitably treat it, cool it, aerate it and return
6 it to the channel, they are relying upon considerable
7 degree of mixing occurring in the channel between their
8 returned water and the relatively enormous volume already
9 in the channel, flowing past the site of introduction.

10 MR. EVANS:
Excuse me a minute, Mr.
11 Commissioner.

12 Q Does your assessment team
13 have a checklist of chemicals which might be on board
14 during resupply of these sites?

15 A If these are-- I believe
16 these are listed in the submission documents, at least
17 for the Taglu one.

18 Q Just a minute, I'll see if
19 I've got it here. I can't find it but that's not surpris-
20 ing.

21 A I believe these lists are
22 being prepared in the original tri-company submission
23 as well, and I certainly have seen this and they didn't
24 hold very many surprises.

25 Q So, you've got a list from
26 them of the chemicals involved, eh?

27 A I believe so, yes

28 Q Have you done work to de-
29 termine the potential environmental damage from the spill
30 of these chemicals?

1 A Sorry, what do you mean by
2 have I done work?

3 Q I assume that some of these
4 chemicals are potentially toxic. Is that correct?

5 A Yes, that's correct.

6 Q Now, have you looked into,
7 or has your team looked into the effects of a spill of
8 these chemicals, on the environment?

9 A With respect to most of the
10 the actual effects, the toxicities are in fact known. I
11 don't see too much point in carrying out research into the
12 specific effects of any one pollutant. There are none
13 there that are particularly surprising.

14 Q But surely you must have
15 given some thought as to what the effects on the wildlife
16 might be in the area of a spill.

17 A Oh yes , yes, of course.
18 Well our normal assessment procedure for any of these
19 toxic chemicals is to evaluate the containment and the
20 handling methods which are going to be used with respect
21 to any one of them, and our impact assessment is based,
22 largely, on the efficiency with which those processes
23 are carried out, rather than the actual impact of the
24 chemicals on the environment, should they get into it.
25 This is more or less understood.

26 Q Have you evaluated their
27 systems for unloading these chemicals at the site.

28 A Yes.

29 Q And what's your opinion of
30 them?

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1 A I think we're really get-
2 ting into the area of cumulative impact, and we're talk-
3 ing really specifically about one site that we've gone
4 into in the most detail so far, and I don't really think
5 that I can answer that question until all of the inform-
6 ation is in from all of the companies.

7 Q So are you saying then, that
8 the individual impact or the-- of this site would not
9 be that serious but you're concerned about the cumulative
10 effect of spills from it, as well as other sites. Is that
11 correct?

12 A That is correct. We are
13 addressing the cumulative impact of all three developments,
14 yes.

15 Q So, you haven't actually
16 looked in detail into the effects of a spill in this
17 one particular site.

18 A I think very broadly we
19 have looked at the size of the potential areas to be
20 impacted by spills of any of the hazardous chemicals, or
21 fuels and in some cases, domestic wastes and tried to
22 determine the sensitivities of the areas which are liable
23 to be affected by such spills, and that goes for really
24 all three areas, not just the Taglu site.

25 Q Now, I assume you have
26 looked into the system of transfer lines at their pro-
27 posed wharf to transfer these chemicals from the barge
28 to their holding tanks. Is that correct?

29 A That's been part of the
30 assessment, yes.

1 Q What's your evaluation of
2 their system? Is it going to work? Are there enough
3 safeguards?

4 A Again ,I think I'd rather
5 leave that question as one which is an ongoing consider-
6 ation, which will be lumped together with the other two
7 sites.

8 Q Well, in other words you
9 don't want to make any statement about it at this time.
10 You don't feel that you should.

11 A I would rather not, because
12 the actual transfer and handling of the fuels and hazard-
13 ous chemicals from barges to, on land and then from land
14 to their subsequent disposition, in any of the facilities
15 is still part of the ongoing process.

16 Q Are you under direction not
17 to discuss that?

18 A No, I'm not. It's just that
19 I consider that it probably wouldn't be fair to the three
20 companies to make specific comments on an individual
21 submission, when we haven't really had the benefit of
22 all of the information which they are liable to be pro-
23 viding to us.

24 Q Mr. Commissioner, should
25 I drop that point of questioning. I feel there must be--
26 I mean it arouses my suspicion. I feel there must be
27 something here that warrants our looking into it.

28 THE COMMISSIONER: Mr.
29 Goudge.

30 MR. GOUDGE: I've spoken to

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1 to the witness about this general kind of questioning
2 sir, and he indicated to me, as I think he's indicated
3 today on the record, that his concern is a simple pro-
4 fessional one, that it's difficult to pass opinions with-
5 out the full set of facts in front of him, and he's very
6 reluctant to do that. I would think sir, that in those
7 circumstances that's probably the furthest we can go with
8 this witness. If he's unprepared to pass his opinions
9 because he doesn't feel he has enough information that's
10 his professional prerogative to do so, I would think.

11 THE COMMISSIONER: Yes. I
12 would agree.

13 MR. EVANS: O.K.

14 THE COMMISSIONER: It's like
15 bringing in an interim report before the evidence is all
16 in.

17 MR. GOUDGE: I must say I support
18 Mr. Snow, because I was interested in the same kind of
19 information and got the same answer. That's why I know
20 what he thinks about the subject.

21 MR. EVANS: In this particu-
22 lar case, Mr. Commissioner I did not explore the matter
23 with him and that's the reason why I'm now at loose ends.
24 I wonder if I might now have a minute to discuss this matter.

25 Q Now, Dr. Snow, I'd like to
26 turn to the matter of sewage treatment at Taglu, and I
27 guess if you run into the same problem you had before,
28 then we'll understand your reasons.

29 Now, in their evidence of page
30 15, they say the precise treatment process for domestic

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1 sewage has yet to be selected , but both physical, chem-
2 ical and extended aeration biological systems are pot-
3 entially suitable and are currently being evaluated. The
4 treated effluent would be disinfected and pumped back to
5 river in a heated utilidor and injected through a submerged
6 diffuser. Now I wonder-- I assume that physical, chem-
7 ical and aeration biological are terms of art, you know
8 used by all specialists in this area. I wonder if you
9 could give us a definition of those terms.

10 A Yes, could you just specify
11 the terms again please?

12 Q Physical, chemical and
13 aeration biological.

14 MR. MARSHALL: Mr. Commission-
15 er , I think this sort of evidence was gone into in some
16 length when Mr. Lawrence was called as a witness for
17 Foothills. He was cross-examined on various methods including
18 sewage. I think this is all on the record in some length.

19 MR. EVANS: Well I, of
20 course wasn't present Mr. Commissioner, and haven't had
21 a chance to look at the transcript. I don't suppose it's
22 available yet.

23 MR. MARSHALL: It was a few
24 months ago.

25 MR. EVANS: Well, in any
26 event I haven't looked at the transcript.

27 THE COMMISSIONER: - Yes , I
28 understand. We understand the reason why but--

29 MR. BAYLY: Mr. Commissioner,
30 Mr. Lawrence was here for one of the pipeline applicants.

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1 now, whether the sewage treatment methods or the size of
2 the operation is the same, or can be compared is something
3 I don't know and if there are no differences it isn't worth
4 going over perhaps with this witness, but if there are
5 differences, perhaps it is.

6 MR. EVANS: It's also possible,
7 I would imagine that there are differences of opinion as
8 to the meaning of those words.

9 THE COMMISSIONER: Well if
10 there are I would prefer not to know.

11 WITNESS SNOW: If I may make
12 a comment, maybe the question will become unnecessary

13 THE COMMISSIONER: Good.

14 A The area that you are ex-
15 ploring right now-- this is a-- this type of statement
16 where the applicant has not finalized his design criteria
17 for any particular component of the facility, for all
18 three of these applications, when we come across these
19 statements, this is the sort of thing we go back to the
20 company with , to request additional clarification or
21 a positive statement as to what system they do intend to
22 use, so therefore there's going to be nothing profitable
23 coming and exploring a potential system such as the
24 sewage disposal that Imperial proposes, when they haven't
25 themselves decided whether in fact they are going to use
26 that.

27 MR. EVANS: Well, in that
28 case I won't ask any more questions about the Taglu
29 application.

30 Q I wonder if one of you

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1 gentlemen could tell me if-- in your opinion if
2 Beaufort Sea-- in the Beaufort Sea a functional clean -
3 up test should be a prerequisite to the issuance of a
4 drilling authority. I think I've probably confused them.
5 What I want to know is, if before a drilling authority is
6 issued to Canmar they should be required to present a
7 functional clean-up plan, as a prerequisite I just wondered
about your opinion on it.

8 THE COMMISSIONER: Mr. Evans,
9 I'm not here to go into that. The Inquiry is looking at
10 the long term impact of oil and gas exploration and
11 development activity in the delta and the Beaufort Sea;
12 activity dependent on the decision to establish this
13 pipeline corridor and it's not going to help me to have
14 Dr. Snow's opinion as to whether certain conditions should
15 be fulfilled before a drilling permit is issued to Canmar.
16 It just isn't going to help me assess those long term
17 impacts, and that's all there is to it.

18 I'm not here to review the
19 cabinet's decision to go
20 ahead with offshore drilling back in '73, and -- they
21 didn't ask me to do that, I don't intend to do it.

22 MR. EVANS: Very well, Mr.
23 Commissioner, I'll withdraw that question. I have one
24 final question then.

25 Q I wonder if you gentlemen
26 would agree that the capacity to clean up an oil spill
27 in the Beaufort Sea is limited to relatively calm water
28 during summer--The effective capacity.

29 WITNESS LOGAN: That's one
30 area in which it can work but also remember that you

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1 can also burn off the oil in the Beaufort Sea in the
2 summer when it's coming through the landfast ice in
3 the spring.

4 Q But would you agree that
5 their effective capacity is limited to the summer.

6 THE COMMISSIONER: No, he
7 just said they can burn it off in the spring as it comes
8 into the leads. I thought that's--

9 MR. EVANS:

10 Q Do you think they have the
11 capacity to deal with it then, other than in the spring
12 leads and during the summer.

13 A If I interpret your quest-
14 ion correctly, Mr. Evans, you're saying, can they deal
15 with it in the spring, and can they deal with it in the
16 summer.

17 Q Oh, my original statement
18 was that I thought that they could only deal with it
19 during the summer, and I invited you to comment on that or
20 agree with it, now you're saying that they can also deal
21 with it in the spring leads.

22 A No,

23 Q How about the rest of the
24 year?

25 A No, I said they could deal
26 with it when it came up through the ice, in the landfast
27 ice area.

28 Q At what time?

29 A In the spring, and they
30 can also, as I stated earlier, can deal with it when the

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1 environmental conditions -- when they have very basically
2 quiescent water in the summer time. It can be dealt with
3 at that time.

4 Q Would you agree that they
5 have a pretty limited capacity to deal with a spill on
6 the Beaufort Sea?

7 THE COMMISSIONER: Well, that's
8 asking the witness to-- he's made that clear --

9 MR. EVANS: I just wanted to
10 make it clear myself.

11 THE COMMISSIONER; Well, that's
12 a matter of-- you've asked him the capacity from zero to
13 ten and I think they said it was two and they reinforced
14 that and we don't have to have them say it again. I'm
15 not absolutely stupid. I understand what they're driving
16 at.

17 MR. EVANS: Very well, Mr.
18 Commissioner, I don't have any further questions.

19 MR. GOUDGE: Mr. Hollingworth
20 I think you're next.

21 CROSS-EXAMINATION BY MR. HOLLINGWORTH:

22 Q Mr. Pettigrew, when you
23 speak of a large oil spill, I wonder if you could quantify
24 that for me.

25 WITNESS PETTIGREW: I'm sorry
26 I didn't hear you.

27 Q When you speak in your evidence,
28 of a large oil spill, I wonder if you quantify what "large"
29 implies to you, in terms of gallons or barrels.

30 A I'll give you two examples,

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1 the ones I talked about earlier this morning. These are
2 relatively large size spills. One other example of a
3 large one might be the Nipisi oil spill in, once again
4 in Alberta, from an eight inch pipeline that was approx-
5 imately 70,000 barrels escaped. In my terms these are fairly
6 large on the basis that clean up is quite a problem when
7 you get up into that order of magnitude , large spills
8 also would be those resulting from tanker collisions,
9 that sort of thing. If you want to go back in history--

10 Q No. Really what I'm inter-
11 ested in is whether there's first of all a definition
12 among you experts as to exactly what constitutes a-- what
13 quantities would constitute a small oil spill, what would
14 constitute a medium one, and what would constitute a
15 large one, or whether it's a subjective thing.

16 A Somewhat subjective , I
17 would think. There's a lot of **parameters** and a lot of
18 measures as to what is a -- let me mention the differ-
19 ent terms. A major spill, and a minor spill and a large
20 serious spill, these are different measures again, and
21 a small spill, I suppose could be measured in terms of
22 a few hundreds of barrels, a large spill we get up into
23 five digits and beyond.

24 Q Is that an agreeable sort of
25 definition to you Dr. Snow ?

26 WITNESS SNOW: Yes, I think that
27 puts it in--

28 Q Sorry, Mr. Logan.

29 WITNESS LOGAN: Well, for our
30 own internal working use we've set our spills up to 1000

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1 gallons, medium size spills up to 100 tons, and anything
2 in excess of 100 tons is a large spill. But that's just
3 for internal working use .

4 Q So that, with respect to
5 construction and operation of a gas pipeline, your main
6 concern, would I would take it be on the construction
7 phase.

8 WITNESS PETTIGREW: I didn't
9 get your question really specifically .

10 Q Well, we've dealt with
11 what constitutes a small, medium or large oil spill.
12 Now this Inquiry is dealing with applications for a
13 natural gas pipeline, and obviously it's not transporting
14 oil. So , would I take it from that that your concern
15 with respect to the proposed Mackenzie Valley pipeline
16 would be more in the construction phase, than in the
17 operation and maintenance phase ?

18 A For the gasline, I would
19 say yes.

20 Q So that the contingency
21 plan that you have set out, Mr, Pettigrew, relates more
22 to the construction phase, than to any other.

23 A For the gasline , but in
24 the submission, the aspect of an oil line is also incor-
25 porated.

26 Q Well, then let me be clear--
27 for instance on page eight, you get into specifics and
28 you say " components of a Mackenzie Valley pipeline spill
29 contingency plan". Do I understand you then to be referring
30 to a Mackenzie Valley oil line?

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1 A I think the portion that
2 you've picked there has to do with the gas line. In
3 another part of the submission the oil^{line} aspect was incorp-
4 orated.

5 THE COMMISSIONER: You deal
6 with the construction-- the construction phase here. You
7 say " which might occur during the construction or oper-
8 ation of a pipeline spill of oil or chemicals."

9 MR. HOLLINGWORTH:

10 Q Let me make another reference
11 on page 12 you say-- you list specific recommendations
12 for a Mackenzie Valley pipeline. Are you there referring
13 to an oil line or a gas line or both?

14 A What line is that?

15 Q That's about the middle
16 of page 12. It's underlined.

17 A M-hm. This would incorporate
18 the oil line aspect as well. We're talking about a contin-
19 gency plan that fits the construction phase and the prod-
20 uction phase and we've assumed that-- I believe that this
21 includes the oil line as well.

22 Q Maybe I'm reversing myself
23 here. That's my problem, Mr. Pettigrew. We've heard a
24 substantial amount of evidence relating to oil and oil
25 exploration this week, and this is , after all, an Inquiry
26 about a gas pipeline, and I just wanted to clarify whether
27 in this evidence you were speaking of an oil pipeline or
28 whether you were speaking of an oil pipeline and any
29 oil spills that could result from the construction and
30 operation of a Mackenzie Valley gas line.

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1 A Certainly that's true. The
2 spills that could result from the construction phase of
3 a gas line and also the spills that could occur from an
4 oil line.

5 Q Then you're recommending
6 that this contingency plan be undertaken by any gas line
7 proponent as well as by an oil line proponent.

8 A I think it has application.

9 Q All right. Now on page four
10 sir, about a third of the way down, you list a variety of
11 materials that could present problems if there were an
12 accident of some sort and later through your evidence you
13 go through, I think a very complete and very sensible
14 contingency plan for cleaning up these materials, but
15 that's the basis of my question. Are all these materials
16 covered by your subsequent plan or does your detailed
17 plan refer only to oil?

18 A Are you referring to the
19 detailed plan that the proponent would develop?

20 Q That's correct. And if it
21 was developed along the lines that you suggested, and as
22 I say, I think that you've got a very complete and very
23 sensible plan set out there, but is that suggested plan
24 merely for oil, or is it for all those materials including
25 the ones you've listed on page four?

26 A I think it should include
27 contingency planning for those products such as we set
28 out on page four.

29 Q Well, would your plan be
30 the same for these materials set out on page four, as it

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1 would be for oil, or would there be different plans?

2 A They might be. It depends
3 on the type of material you're talking about. Let me give
4 you the example of methanol with the plan that Canadian
5 Arctic Gas had for the use of methanol, that is, in my
6 opinion it's one-- it's a large enough volume of liquid
7 to give consideration to that type of thing, but that's
8 a different thing in my opinion, than certain stock piles
9 of lubricants and as mentioned here on page four,

10 " X-ray photographic chemicals etc."
11 these have toxic aspects. These are in different types
12 of containers, they're not liquids and so on, and I think
13 there is a difference between these two. You have to allow
14 for contingency handling in different ways.

15 Q Well, O.K. then the point
16 being that I guess the different items listed on page
17 four require a different plan than from that you have
18 set out later on in your presentation.

19 A That's right.

20 Q Perhaps we could take an
21 example; say x-ray, photographic chemicals. Do you have
22 specific recommendations for the handling and use of
23 those, along the lines of your presentation?

24 A No, I do not at this stage.

25 Q What about for the other
26 materials you've listed on page four?

27 A Are you thinking in terms
28 of methanol as an example?

29 Q Well, methanol isn't listed
30 there. I put that aside for the time being. There has been

1 a fair amount of discussion on that. Let's take spent
2 engine oils and fluids. Would you have a specific recommen-
3 dation on those?

4 A Well, I would say for spent
5 engine oils and fluids, these must-- have to be handled
6 in a special way. The same-- maybe something in the same
7 way spent engine oils and crank case drainage
8 fluids are handled in cities, this is far from an
9 exact science at this stage, but this is the type of thing
10 that needs consideration. Instead of dumping them down
11 the sewer drains like-- and this still occurs in many of
12 our cities, and thereby directly into rivers, these need
13 to be contained and recycled, etc.

14 Q I don't think I have any
15 quarrel with that view, Mr. Pettigrew, It's just that I
16 was interested if you had reflected on these particular
17 substances, and whether you'd come up with specific ideas
18 for the handling of them.

19 A Not specific, at this
20 stage.

21 Q All right.

22 THE COMMISSIONER: Mr. Logan,
23 when you were answering Mr. Evans' last question about
24 present capacity to clean up an oil spill, you indicated
25 that in the landfast ice, when the oil appears in spring,
26 you could burn it off. I take it, you restricted that to
27 the landfast ice because of the problem of access in--
28 before weathering has taken place farther out. Is that
29 the point?

30 WITNESS LOGAN: That was one

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1 of the points. Excuse me, is my mike on or off?

2 MR. HOLLINGWORTH It's on I think.

3 WITNESS LOGAN: Is it on?

4 Oh, I see.

5 No, in the permanent polar
6 pack, as I understand it , the-- now let me digress here
7 for a minute. In landfast ice it's usually first year
8 ice, and the brine channels in the ice are complete, So
9 this is the migration route, and possibly Mr. Milne has
10 brought this out in his testimony, and it's my under-
11 standing that for example the permanent polar pack ice,
12 these brine channels are destroyed, in multi-year ice
13 which makes up most of the permanent polar pack, so there
14 really is no escape route for the oil to migrate to the
15 surface. There has been no test done on permanent polar
16 pack and there has been no testing done on shear zone
17 ice, so we have no idea what can happen.

18 THE COMMISSIONER: And--

19 yes, I see.

20 MR. GOUDGE: What was the
21 phrase you used, throughout "brine channel"?

22 A Brine channels.

23 MR. GOUDGE: Perhaps for the
24 reporter you could spell that.

25 A B-R-I-N-E.

26 MR. GOUDGE: I wonder, can
27 I ask sir, what that is ?

28 MR. HOLLINGWORTH: You're
29 spelling it for Mr. Goudge, I think.

30 A I'm not an expert on ice

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1 so anything I say could be questioned by someone who's
2 an ice expert, but it's my understanding that sea ice,
3 when it is formed, it is the water crystals, fresh water
4 crystals which are freezing and the brine which is in the
5 sea water escapes or is forced out of the ice, and these
6 migrate down through channels which they create, in other
7 words you could use the analogy of putting salt on roads,
8 and how it reacts with ice, and the brine migrates down
9 to the underside of the ice sheet.

10 WITNESS PETTIGREW: Might I
11 add a thought here, Mr. Goudge, to elaborate just a point.
12 Is this all right? I understand that these brine chan-
13 nels exist in the late spring, up to a centimeter in
14 diameter, maybe a little larger. I'm no expert on ice
15 either but these are significant avenues of escape, through
16 which the oil would travel up to surface, and a recent
17 experiment in Balaena Bay, out of some-- an example--
18 out of some 400 barrels of oil entrained in the ice
19 during the winter, I think it was something in the order
20 of 90 percent of it, travelled up the brine channels
21 and was burnt on surface in the spring.

22 MR. HOLLINGWORTH: Do you
23 want me to start on a new line of questioning or --

24 THE COMMISSIONER: All right,
25 lets adjourn until two.

26 (PROCEEDINGS ADJOURNED AT 12:30 P.M.)
27
28
29
30

1 (PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

2 THE COMMISSIONER: Ready to begin,
3 are we? Mr. Hollingworth.

4 MR. HOLLINGWORTH: Thank you
5 Mr. Pettigrew, if I can return to your evidence in chief,
6 on page 8, under the heading "Scope", the last sentence
7 there says,

8 " It should also take into account accidents or
9 environmental extremes which could originate
10 outside or spread beyond the right-of-way
11 boundaries, such as oil, or chemical spills from
12 other operations in the area, flooding, landslides,
13 and vandalism."

14 The first part of that sentence seems to indicate to me
15 that you're talking about operations carried on by the
16 pipeline company itself, and then when you get down to
17 the end I'm not sure whether you're discussing that, or
18 discussing operations by other parties; and you're talking
19 about a co-ordinated plan.

20 WITNESS PETTIGREW: I think an
21 adequate contingency plan has to consider all those
22 aspects, and whether something may happen to stockpiles
23 of equipment or storage tanks, et cetera, through
24 possibilities of land slumping or landslides; I mean this
25 is something that you can only assess by looking over the
26 specific ground in the vicinity, all of it; an area or
27 a staging area like that --

28 Q Yes, I'll come to that in
29 a moment if I may, but right now I'm just interested in
30 whether there you're speaking of operations carried on

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1 by the pipeline company, whether they're on the right-of-
2 way or not, or whether you're talking about operations
3 carried on by parties other than the pipeline company.

4 A I still think it can be
5 both. I think you have to include that in an adequate
6 contingency plan.

7 Q All right. Now, when you
8 talk about flooding and landslides, I assume that
9 really the only way to guard against that is proper
10 location in the first place. There's nothing really that
11 you can build into a contingency plan to guard against
12 that, is there, except -- I'm excluding now flooding and
13 situations on the delta, which was discussed this morning.
14 Talking about the pipeline itself. Do you see any other
15 way of drawing up a contingency plan to guard against
16 flooding and landslides, other than location?

17 A Not really, not other than
18 location, to be aware of those threats.

19 Q Do you have any specific
20 recommendations to curb vandalism, except for human
21 guards?

22 A No, I don't pretend to be
23 an expert on that. I think that's up the company to
24 investigate, if there is that threat.

25 Q Okay. Now with -- on page
26 9 you talk about one consideration being whether spill
27 clean-up and containment will be done by in-house staff
28 or using private contractors; and I expect you to agree
29 with me that in the Northwest Territories it would be
30 rather difficult to rely on outside contractors for that

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1 sort of work.

2 A No, I think outside
3 contractors are available, if I read your question
4 correctly I would assume that. I believe contractors are
5 available for work in the Northwest Territories.

6 Q Yes, I suppose they are.
7 What I'm concerned with is whether you would get a
8 specialization of this nature, among outside contractors
9 in the Territories; outside contractors who dealt with
10 oilspills, and other such things that were available to
11 deal with them.

12 A Maybe not at this present
13 time. Some of the specialist clean-up contractors that
14 exist in, let's say Alberta, these groups have done work
15 on clean-up in the Northwest Territories, in the past two
16 years, and I would expect in the next few years there
17 may well be a branch of that same organization or other
18 comparable organizations, possibly located in Yellowknife,
19 maybe Inuvik.

20 Q I see. So these would
21 be people such as the ones you spoke of this morning
22 who came in and fixed up the fields to such an extent
23 that the crops were apparently unharmed.

24 A That would be one type.

25 Q I see. So that it would,
26 I would suggest to you, it would probably be more the
27 people who come in a little later and do the real mopping
28 up, as opposed to the people who go out in the first
29 instance and try and contain the spill.

30 A M-hm...

1 Q I see; and I assume you
2 visualize that the pipeline staff who are on call for
3 such emergencies would normally be doing something else,
4 I mean, they're not like firemen who sit around and wait
5 for a specific event to happen; that's not what you're
6 visualizing, is it?

7 A No.

8 Q No, okay; and that's what
9 Interprovincial would do, is it?

10 A I don't think they sit
11 around, as firemen, waiting for a fire to put out; I
12 read you correctly that time.

13 Q They've got staff normally
14 doing other things who are also trained to handle these
15 emergencies.

16 A That's correct.

17 Q I see. Have you given any
18 thought to how many -- I forget your term for it -- but
19 essentially how many emergency offices there would be,
20 down the length of the Mackenzie Valley Gas Pipeline?

21 A How many emergency offices?

22 Q Well, I think your term
23 for it is -- do I have you right, S.R.O. -- S.R.C., I'm
24 sorry, Spill Response Center. How many would you visualize
25 there being down the length of the Mackenzie Valley Gas
26 Pipeline?

27 A I think this depends quite
28 a bit on the individual company's organization for the
29 construction of the pipeline, where they have their main
30 stockpiles of equipment, their pumping stations and so

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1 on, I think it should be designed primarily from that,
2 and spreads on which they work, and time factors, and that
3 sort of thing.

4 Q Well, would you visualize
5 one in every construction spread?

6 A I would -- if there's a
7 number of construction spreads at any one time, then I
8 would think that some kind of a Spill Response Center
9 organization could well be organized to function out of
10 those places, at any one time. I see more that, just say
11 one in the Inuvik area, or one down at the southern end.

12 Q That's what I was interested
13 in -- sorry, did you have something to say, Dr. Snow?

14 WITNESS SNOW: No, it's okay.

15 WITNESS PETTIGREW: Dr. Snow's
16 comment here is that he feels that would depend on a
17 logistics radius, and this is what I was trying to say,
18 he may have said it a little better.

19 Q All right, I think I
20 understood you. Would you see then equipment being
21 stored in each of these Spill Response Centers too, in
22 other words on each spread, much the same type of
23 equipment.

24 A M-hm.

25 Q Okay. Have you given any
26 thought to the inventory of equipment that each spread
27 might carry?

28 A We've given some thought
29 to it. We think that this is once again, in the submission
30 here, this is to cover many aspects of contingency

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1 planning, and not directly -- we didn't concern ourselves
2 directly with some of those specifics. The inventory, my
3 only comment there would be I think that a company would
4 expect -- would build into their inventory, at the various
5 locations along the pipeline system, that type of
6 equipment which could contend with spills and cleanup,
7 and containment, and that sort of thing; dependent to some
8 degree upon the sensitivity of the area that you're --
9 there may be in the vicinity of any one of those, if you
10 follow me.

11 Q Yes, I do.

12 A I'm saying that the
13 sensitivity aspects and the threat aspects may be
14 different, in one part of that long line, as compared to
15 another.

16 Q No, my thought was that
17 you, you know you've obviously devoted a great deal of
18 thought to this scheme that you have outlined in your
19 evidence, and I just wondered if you had got down to the
20 specifics of what specific pieces of equipment you would
21 recommend at each spread?

22 A The equipment that is
23 available today to contend with containment, clean-up,
24 disposal, et cetera; and to state a few of them, and
25 we've been talking about them, in today's world, these
26 are essentially booms, slick-lickers, boats, pumps,
27 et cetera.

28 Q Now, on page 14 at the
29 bottom, you state that consideration should be given to
30 fabricating and installing spill barriers and surface

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1 runoff ditches, and depressions likely to catch oil or
2 chemicals around some facilities. Are you thinking of
3 these being installed prior to any spills occurring?

4 A In some cases, yes, and
5 I think it depends so much on the lay of the land, and the
6 investigation that a company might have made. As an
7 example, along the root of the pipeline, for instance if
8 that was in the valley portion, the tributaries leading
9 into the valley and along the corridor; there may well be
10 some of those tributaries that, where such spill barriers
11 could be constructed prior to -- depending again on the
12 location of the storage tanks and storage facilities; and
13 I'm not thinking here of a great earth work or cement
14 barrier, necessarily. It might not even have to be a
15 barrier, as such, but the equipment available to construct
16 say, a barrier, or a dam, that could retain spill material
17 as it got into the tributary. As an example --

18 Q I feel I'm a bit ignorant
19 on this, but it seems to me if you construct a spill
20 barrier, aren't you also preventing the ditch or low
21 depression from draining, the surrounding area of water?

22 A It depends on -- from the
23 design, I would think. There are barriers with weirs,
24 culverts, all sorts of designs.

25 Q All right. So, because you
26 earlier said that most chances of an oil spill on a gas
27 pipeline would occur during construction, and I assume
28 that such barriers would have to be built right at the
29 very outset of any logistics scheme, carried out by a
30 pipeline proponent to be really effective.

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1 A I think it depends on the
2 lay of the land, circumstances. This is -- the words
3 there, I'll repeat them again -- consideration should be
4 given to fabricating and installing spill barriers, et
5 cetera.

6 Q Well, I'm not quarreling
7 with the idea, Mr. Pettigrew, don't get me wrong, it's
8 just that it seems to me that if we acknowledge, as we
9 seem to have, that most chances of an oilspill on a gas
10 pipeline would occur during the construction phase; I'm
11 suggesting that really these spill barriers wouldn't be
12 of much use unless they were put in and installed prior
13 to any real construction getting underway for a gas
14 pipeline.

15 A Depends how you look at it.
16 Do you have a comment there?

17 WITNESS SNOW: I would tend to
18 agree, that if they are to be effective, they should be
19 installed at the outset.

20 Q I was going to put this
21 question to you, Mr. Pettigrew, but possibly Mr. Logan
22 is the proper party. I had intended to ask you about
23 the guidelines with respect to dispersants, and my friend
24 Mr. Evans went into that. I wonder if you could just
25 give some brief comments on the amount of research being
26 conducted into developing new dispersants, and possibly
27 ones that are less offensive to the environment in
28 general.

29 WITNESS LOGAN: If you could
30 take your mind back to the Torrey Canyon, when that broke

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1 up in English Channel, the dispersants which they had at
2 that time were extremely toxic to the environment. The
3 dispersant manufacturing companies which are mainly the
4 petro-chemical companies, started to develop reasonably
5 safer toxic dispersants on the insistency of the British
6 government, who established dispersant guidelines. We
7 did it, and some European companies, so consequently the
8 dispersants used now are accepted for use in both the
9 United Kingdom and Canada, are much safer than the
10 dispersants that were available at the time of the
11 Torrey Canyon. There is ongoing research by petro-
12 chemical companies to develop safer dispersants and
13 different methods of applying them.

14 Q Well, that's what I was
15 interested in. What state is this development in, do you
16 have any ideas?

17 A Unfortunately, it seems
18 to be regressing. They've looked at the point of view
19 of faster ways of putting them on, but the dispersants
20 which they have developed are also returning to extremely
21 high toxicity phases.

22 Q Okay. You could, I suppose
23 get a situation then where you had a fast application and
24 it was pretty devastating to the immediate area, but did
25 disperse it before it got into a large area.

26 A Well, dispersing is not a
27 cure for oilspills, it's just like a very poor house-
28 keeper instead of removing the dirt from the house, she
29 puts it under the rug -- pardon me -- person puts it
30 under the rug. It's cosmetic.

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1 Q It's one of a series of
2 steps in an unsatisfactory situation.

3 THE COMMISSIONER: Well, you said
4 it's causematic merely--

5 A That's all, puts it off
6 from the top of the water into the water column, that's
7 all it does.

8 THE COMMISSIONER: That could
9 cause more damage than --

10 A In our testing which we are
11 doing in Halifax, we have a standard of a thousand
12 milligrams per litre, a dispersant must pass that in orde
13 to ^{be} met; but when you mix it with say number two fuel oil,
14 which is your diesel; toxicity is increased by tenfold --
15 by order of magnitude, pardon me; so you go down to a
16 hundred milligrams per litre.

17 THE COMMISSIONER: Those, among
18 other reasons are why you are -- as things stand now --
19 almost totally opposed to the use of dispersants in the
20 Beaufort Sea.

21 A Well, totally opposed to
22 the use of dispersants.

23 Q Totally opposed.

24 A Right.

25 Q I think Dr. Snow said as
26 a last resort, that they might be used -- or I thought
27 you had said that --

28 A As a last resort, they
29 would be considered.

30 MR. HOLLINGWORTH: Didn't I

Snow, Pettigrew, Logan
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1 understand that your guildlines to allow the use of three
2 dispersants which you named?

3 A They allow them to be used
4 provided they're approved by the people on site for use.
5 They're not to be used holus bolus by any individual. Federal and
6 Provincial authorities must approve their use.

7 Q Mr. Pettigrew, as part
8 of the contingency plan, I take it that the disposal sites
9 for pollutants and contaminated materials would be ones
10 that were selected far in advance, would they?

11 WITNESS PETTIGREW: I think they
12 should be.

13 Q And presumably a land transfer
14 or rather, a land use permit, would be required in
15 advance --

16 A Yes, I think so.

17 Q -- even though you may never
18 use the property for the proposed use?

19 A Right.

20 Q Mr. Snow, if I could turn
21 to you for a moment, page 13 of your evidence, you've
22 got a series of questions there, and I was wondering if
23 I could turn those around to you again, and with respect
24 to question one through three, ask what your recommen-
25 dations would be for these activities?

26 WITNESS SNOW: The first one,
27 "what measures have been taken to ensure the transfers
28 of fuel and other hazardous chemicals would take place
29 with minimal risk of spillage", I would like to see
30 some sort of training program, whereby the personnel

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1 that are going to be involved in these processes, are made
2 familiar with the particular properties of the substances
3 with which they're dealing; and to ensure that ^{they} discharge
4 their duties conscientiously; and in connection with this,
5 there should be well trained supervisory personnel to
6 ensure that the actual operators do in fact carry out
7 these duties, in the way that the company was specifying.

8 With respect to the second one,
9 "Have the containment and clean-up measures envisaged
10 by the applicant been tested under the conditions under
11 which they are anticipated to be used?" I haven't
12 actually seen a demonstration of booms, or any of the
13 containment equipment stockpiled by D.E.P.U., for
14 example, anywhere along the Mackenzie system, and I
15 would obviously recommend that that equipment be tested.
16 They would also be periodically checked, whilst it's
17 on the shelf, to make sure ^{that} when it does need to be
18 deployed, that it is in a useable condition.

19 Thirdly, "does the applicant
20 intend to test such precision equipment periodically,
21 if so how frequently does he intend to have practice
22 drills, to ensure personnel are familiar with and
23 proficient at executing such procedures?" I think
24 what I've said in one and two above, pretty well covers
25 that one too.

26 Q Do you have any frequency
27 to recommend?

28 A I think a reasonable
29 length of time would be twice a year.

30 Q Now, earlier in your

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1 evidence, you raised some fears, because you speak of the
2 flat shorelines of the Arctic Ocean, and compare these
3 unfavourably with the self-cleansing ability of rocky
4 shorelines, such as you get on the east or west coast
5 in more temperate zones of Canada.

6 A Yes.

7 Q That's correct? Is there
8 any empirical evidence to show that there's less self-
9 cleansing ability in these Arctic areas, with flat
10 shorelines?

11 A Yes, there are. First of
12 all, I think you may be under a misconception here. I'm
13 not saying that the shoreline of the Beaufort Sea has
14 no self-cleansing ability. I'm saying that the biological
15 agents which have been largely responsible for the clean-
16 up of weathered oil on rocky beaches in more temperate
17 latitudes, are absent from the intertidal biota of the
18 southern Beaufort Sea. The evidence that heavier oil
19 residues are not cleaned up very rapidly under Arctic
20 conditions, can be seen in Resolute Bay, for example,
21 where there was a bunker sea spill, approximately ten
22 or fifteen years ago, and the tarry residue is still
23 evident on the rocky, pebbly shoreline of the beach there.

24 THE COMMISSIONER: Where was
25 that again?

26 A This is Resolute Bay.

27 Q I'd refer you to a statement
28 that Dr. Grainger gave, one of the first co-panels, or
29 one of the first in this latest period that we've been in
30 Inuvik. He said at the bottom of page 5 and the top

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1 of page 6, and I don't have a transcript reference, sir,
2 because I haven't received any transcript,

3 "Examination showed an abundant population of
4 heterotrophic bacteria, that is, bacteria using
5 complex" - sorry - "utilizing complex organic
6 materials rather than the simple inorganics of
7 the light stimulated autotrophic forms, with oil
8 degrading potential in the Beaufort Sea."

9 That confuses me a bit, because it seems to indicate that
10 there's a lot -- well, what it says, an abundant
11 population of bacteria which can degrade oil, and you
12 seem to be saying the contrary. Do you disagree with
13 Dr. Grainger?

14 A Can you just read out the
15 first sentence again? Did he say that --

16 Q Would it be easier if I
17 showed it to you?

18 A No, just tell me. Did he
19 say that the heterotrophic organisms were very abundant?

20 Q I better read it to you.

21 "Examination showed an abundant population of
22 heterotrophic bacteria, that is bacteria
23 (utilizing complex organic materials, rather than
24 the simple inorganics of the light-stimulated
25 autotrophic forms, with oil-degrading potential
26 in the Beaufort Sea."

27 A Yes. I am familiar with
28 the work that you are quoting, and again I do have a
29 comment on that, but first of all I'd like to say that
30 the self-cleansing ability of the biota of the southern

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1 Beaufort Sea shoreline, sorry, the organisms responsible
2 for the clean-up in southern spills; I referred to earlier on
3 were things like limpets and snails, not heterotrophic
4 organisms; and these are the ones, these are the components
5 of the biota that are not included in the southern
6 Sea intertidal.

7 The fact that there are
8 abundant populations of heterotrophic bacteria, indicates
9 that there is the potential, for oleoclastic activity,
10 for oil-degrading activity, in the southern Beaufort Sea,
11 but the mere presence of these organisms does not
12 necessarily indicate that all of the spilled oil should
13 end up in the intertidal zone or along the shore line,
14 could be in fact bio-degraded by those organisms. They
15 require other environmental parameters, such as temperature,
16 salinity, and so on, to -- for them to effectively
17 metabolize the oil.

18 Clearly, if the heavier tarry
19 residues from a bunker sea spill have persisted after
20 a decade or so in Resolute Bay, then the natural
21 oleoclastic heterotrophic bacteria in Arctic waters do
22 not have the potential to clean up all the oil within
23 that timespan.

24 Q Are you comparing -- are
25 you saying that the waters are exactly the same in
26 Resolute Bay as they are in the Mackenzie or in the Beaufort Sea?

27 A No, I'm not, sorry, I was
28 inferring that possibly the heterotrophic oleoclastic
29 bacteria may be the same in the waters off of Resolute,
30 and also the Beaufort Sea.

Q But you're saying, you said

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1 the temperature differences might make a substantial
2 difference on their ability to degrade oil. Now we've
3 heard evidence that the Mackenzie empties into the
4 Beaufort Sea at substantially high temperatures, 70 degrees
5 fahrenheit.

6 A Yes, I didn't indicate
7 whether it was high temperature or low temperature, and
8 I said that temperature was one of a set of environmental
9 parameters which would affect the metabolic activity of
10 such oleoclastic organisms.

11 Q Well, would it be a high
12 temperature or a low temperature, in which they would
13 operate the best?

14 A I really don't know for
15 sure, but I would suspect the person that did this work
16 is a scientist at Ste. Anne de Bellevue in Dr. Grainger's section,
17 and he's been primarily concerned with the cryogenic
18 oleoclastic bacteria. These are the ones that effectively
19 operate at temperatures around zero centigrade.

20 Q Well, would not the
21 temperature of the Beaufort Sea be in that range a good
22 deal of the year?

23 A Yes, or something in excess
24 of half of the year.

25 Q As I understand it you've
26 been engaged in studies of the Mackenzie Delta lakes.

27 A That's right.

28 Q I was just wondering if
29 you could project from these studies to aid us in
30 developing contingency plans, especially in the delta

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1 area, and perhaps a bit further south. Contingency plans
2 for spills, particularly with respect to a gas pipeline.

3 A Yes, do you have a specific
4 question?

5 Q No, not really, it's a
6 general question.

7 A Well, it's my understanding
8 that the Delta Environmental Protection Unit is the main
9 contingency plan, to be used in the delta, and the offshore
10 area as well as the southern part of the delta. If
11 conditions permit, slantwise booms could be used to
12 direct oil down suitably appropriate channel, and into
13 a small system of lakes, to palm the oil up, which would
14 certainly facilitate its subsequent removal.

15 However, I would like to see
16 a specific plan in term of which areas would be considered
17 to be used. Many of these lakes are located on individual's
18 traplines, and obviously a plan should take this
19 consideration into account, so that the system of three
20 or four lakes which are obviously supporting someone's
21 livelihood, don't suddenly get inundated with thirty or
22 forty thousand gallons of fuel.

23 There are many interconnecting
24 channels in the delta, and I think part of the plan would
25 be to actually specify the ones at which slantwise booms
26 could most profitably be used.

27 Q I think -- sorry, did you
28 have something more to say?

29 A No, I was going to say,
30 obviously from my testimony, I don't have that much faith

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1 in the use of booms, throughout most of the Mackenzie
2 system, in anything other than the quietest times of the
3 year; but the only potential that exists for containing
4 and cleaning up any fuel spill would be if the spilled
5 material were to be diverted into relatively quiet areas
6 such as the small floodplain lakes that have delta channel
7 connections.

8 Q Preferably ones with very
9 little fish life or none.

10 A Yes, I'm thinking of the
11 smaller floodplain lakes which are certainly nursery
12 areas for juveniles of many of the important species of
13 fish in the delta, but in an area of half a million lakes,
14 with the proviso that the lakes to be used are not obviously
15 slap-bang in the middle of someone's trapline, then I
16 think that small numbers of these lakes could be
17 sacrificed. The larger ones that have significant fish
18 populations I don't think you'd be considering diverting
19 spill fuels into anyway.

20 Q I take it if we're talking
21 of sacrifices you would sooner funnel thirty thousand
22 gallons of fuel into one of these small lakes, and
23 possibly ruin traplines, provided you could make monetary
24 compensations to the individuals involved, rather than
25 seeing that fuel go out into the Beaufort Sea.

26 A That would be a very difficult
27 trade-off to have to make.

28 Q Well, we realize you're
29 not in a socio-economic field, so I won't pursue that.
30 Those are all the questions I have, thank you.

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CROSS-EXAMINATION BY MR. MARSHALL:

Q Mr. Pettigrew, with respect to contingency planning related to possible spills of toxic materials that might be used in a gas pipeline construction, would it be fair to consider that there are really three major areas where you have concern, and think there ought to be planning. The first would be river transport, barge transport of fuel and methanol and other substances that may be toxic to the environment. That's one of the major areas, I take it.

The second would be the storage of such items onshore, at staging depots and so on, and the third area might be the spill of methanol during pressure testing of gas pipeline. I wonder, sir, if it would be fair to say that those are your three major areas of concern, with respect to contingency planning, as it would apply to a gas pipeline.

THE COMMISSIONER: Excuse me, would you just mind repeating those three areas, so I can make a note of them?

MR. MARSHALL: Yes sir; the first would be the barge transportation of the various substances to staging locations. The second would be the storage of those substances at compressor stations, camps, wharves, and so on. The third would be during construction and pressure testing of a possible spill of methanol during pressure testing of a gas pipeline.

THE COMMISSIONER: Thanks.

MR. MARSHALL: Are those the major areas of concern that come to your mind, with

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Cross-Exam by Marshall

1 respect to gas pipeline?

2 WITNESS PETTIGREW: I would say
3 those are the major ones. I think I should add a couple
4 of others. Rail transport, if we're talking transportation
5 of fuels and other things, that rail comes into it and
6 transportation by highway or truck transportation. So
7 I'd like to add those too, because everything isn't going
8 to come by river.

9 Q Fine. I take it you'd
10 agree with me that the regulation of safety precautions
11 to be taken by common carriers, be they river, rail or
12 highway, are something that it's really outside the control
13 of gas pipeline company.

14 MR. BAYLY: Mr. Commissioner,
15 is this a question that's proper to put to this witness?
16 Perhaps it is, it just strikes me that he may not know
17 what is within the responsibility of the gas pipeline
18 company.

19 THE COMMISSIONER: Let's find
20 out, because Mr. Pettigrew spends his life examining these
21 problems.

22 MR BAYLY: I'm quite happy if
23 he feels he can field the question.

24 WITNESS PETTIGREW: I would tend
25 to agree with you. I'm not one hundred per cent sure on
26 that score, but it seems to me that the way you phrased
27 that is correct.

28 MR. MARSHALL: Well, what had
29 occurred to me, and I thought perhaps you might have some
30 experience about this, is for example with respect to

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1 rail transportation of petroleum products. The railways
2 would control the manner in which that was done, and the
3 safety precautions that would be taken with respect to
4 that equipment when it's in their custody.

5 A During the transportation
6 phase.

7 Q Yes; and on the river the
8 barge operators would have control over safety precautions
9 and the care of toxic substances being transported by
10 them on their barges. That's your experience, is it?

11 A It is.

12 Q Do you know sir, from your
13 experience, whether or not the barge operators have good
14 or bad experience or track record in handling fuel,
15 being carried on the Mackenzie river system?

16 A I have a little knowledge
17 of that. I believe their track record is quite good
18 indeed; they've had some spill problems, most of the
19 problems, however, have occurred during the transfer of
20 these fuels from barge to shore, or in the other direction;
21 from the shore to the barges; and this has been the main
22 area that's given the problem.

23 Q My understanding is that
24 there's been quite a history of the movement of petroleum
25 products on the Mackenzie system, going back to the days
26 when the Norman Wells refinery was first open, and
27 shipment of petroleum products from that location
28 downstream was taking place. Do you know if that's so
29 or not?

30 A I think there's been a fairly

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1 long history of transportation up and down the river.

2 Q Now, sir, with respect to
3 storage, I took it from your remarks, and I wanted to
4 know whether or not this is accurate, that this is really
5 kind of the key or central area of concern to you with
6 respect to gas pipeline operations, that is, the proper
7 designing and planning for the storage of toxic substances
8 at staging location?

9 A Yes, that's a very key part
of it.

10 Q
I understand sir that you've been involved
11 in some studies that are underway now, involving the
12 APOA and government, working on the design of suitable
13 storage areas, and dyking and impermeable barriers, and
14 that sort of thing.

15 A Dyking, yes.

16 Q This would be the design
17 of dykes to contain any spills there might be from
18 storage tanks.

19 A That's correct.

20 Q Could you just outline
21 briefly to the Commission what planning and research is
22 being carried out, and who it's being done by, sir?

23 THE COMMISSIONER: Carry on, sir.

24 A Thank you.

25 MR. MARSHALL: You can ignore
26 Mr. Goudge, he'll have his turn in a few minutes.

27 A I have provided a report
28 on dyking, which we have developed over the past couple
29 of years. It really was a state of the art study, of
30 this whole question of dyking in the north. I think it

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 Cross-Exam by Marshall

1 would take a long time to go into that, but just a few
 2 highlights that I might respond to, and that is we found
 3 that particularly in the north, there was no consistency
 4 in the dyking and approach to dyking. Most dykes were,
 5 well either non-existent or made of very pervious
 6 material, and were not effective in containing spills
 7 from around tanks or broken flowlines, et cetera.
 8 Subsequent to that state of the art review, we ourselves
 9 have been involved with a number of other organizations
 10 in the north, including industry and governments, and other
 11 agencies; to look at all aspects of dyking, and attempt to
 12 improve the techniques for dyking under these northern extremes,
 13 using innovative, hopefully innovative approaches, because
 14 the ones that have been used for so many years in the
 15 south just do not apply.

16 These involve the use of improved
 17 liners, special grouting techniques, spray on urethane
 18 polimers, and that sort of thing. There's quite a long
 19 range of research being directed or in that direction.

20 Q Could you tell me, sir,
 21 whether or not the technical reports have been produced
 22 as a result of this research that you've just done?

23 A Just the one report isn't
 24 necessarily a technical one, but it's partly that, the one
 25 I referred to. Others are in the stage of development
 26 now, the information is not yet in, but some of the studies
 27 are underway.

28 Q And that work is being
 29 directed by your department, is it sir?

30 A It is at the present time,

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1 with lots of input from the other groups and organizations
2 that I mentioned.

3 Q Do I take it that the
4 objective is to have the comprehensive set of standards
5 that would govern this type of operation in the north?

6 A Hopefully, that's true.

7 Q What's your timetable for
8 having that prepared, sir?

9 A I'd like to think that by
10 the end of this year, 1976, we would have some further
11 information on the efforts now underway in published
12 form.

13 Q Might those then be enforced
14 by regulation, by your department?

15 A That is a little further
16 down the road, but that's part of the idea, on the basis
17 that in order to get there to the regulation stage, we
18 go through the guideline aspect, and so on; but I think
19 that if what we believe might come out of this, I can see
20 that it may be legislated.

21 Q So would it be fair to say
22 then that this is one area where you had a concern, but
23 work is being done and the matter will be in hand, as
24 far as you're able to judge at this time.

25 A That's right.

26 Q Now sir, with respect to
27 methanol and the possibility of a spill of methanol during
28 pressure testing of the pipeline. I take it, sir, that you
29 would have had some experience with pipelines, and pressure
30 testing of pipelines. Is that so?

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1 A No, not really. I'm not
2 a pipeline expert. I've been around a lot of pipelines,
3 seen a number of them break, but I have not been directly
4 involved in that type of thing.

5 Q Have you been involved, sir,
6 in observation of breaks during pressure testing of
7 various pipelines?

8 A Could you ask that again,
9 please?

10 Q Have you observed breaks
11 during pressure testing of pipelines?

12 A I haven't personally
13 observed them, but I have known when pressure tests were
14 coming up, and how they were going to go about it, and
15 the results of the pressure tests.

16 Q Well, sir, the question
17 I have relates to a matter that Mr. Hollingworth got into
18 with you, and I just wanted to get your thinking on this
19 point. You did mention construction of barriers, and I
20 was wondering whether or not you were limiting that in
21 your mind to barriers around storage installations, if
22 you like, as opposed to possible construction of barriers
23 along a pipeline, prior to pressure testing being carried
24 out. I was wondering whether I was reading too much
25 into the statement in your evidence. Perhaps I should
26 give you a little background about it.

27 When I read the evidence, and
28 heard you repeat it, I thought that you were suggesting
29 that in some cases there ought to be constructed some
30 type of barriers to contain possible spills of substances,

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1 along pipeline right-of-ways, and I wondered whether or
2 not you were advocating that, or I just misunderstood your
3 evidence.

4 A Well, I suppose I'll have
5 to repeat what I said before, that I believe it's more
6 pertinent to the stockpiled areas, the storage areas and
7 that sort of thing, but dependent on the lay of the land
8 and what types of fuel and equipment you're looking at;
9 but surely my message was more directed towards prevention.

10 Q Sir, I have no quarrel with
11 the suggestion as it relates to areas where toxic
12 substances may be stored. My concern was with respect
13 to constructing barriers along the right-of-way, because
14 the concern I've heard expressed is that since you can't
15 predict where you might get a break during pressure
16 testing of a pipeline, constructing some dykes or barriers
17 in anticipation of a possible break might well do more
18 damage than would the release of the substance during
19 a break, during testing. NOW, I wonder whether you'd
20 agree with that or not?

21 A I would agree that that is
22 possible. I still believe personally in the prevention
23 approach and this has to depend largely upon the
24 company's evaluation as I see it, or how ^{you} spring out the
25 equipment, where the stockpiling is done, fuel supplies,
26 the lay of the land, proximity of the river, and all the
27 variables, and where you may see that you can prevent
28 a spill by some such structure or barrier, and I think
29 it's up to the company to consider that.

30 Q Well, I'm thinking

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1 specifically of pressure testing with a water-methanol
2 mix, of a gas pipeline. My concern there is, sir, that it
3 may well be unwise to construct any barriers or dykes
4 in anticipation of a possible break that may never take
5 place. You may have done more damage by building the
6 dyke and moving the equipment in and so on to do that,
7 than you could ever --it would outweigh any damage you
8 could possibly get from the break.

9 A I'm not too sure about that
10 at all. When I see the specifications on methanol, I
11 think that I would promote maximum effort in that
12 direction of being sure that you contain the 26% solution
13 of methanol and prevent it from getting in in any manner
14 to a river system. If we're on the subject of methanol,
15 I might want to suggest -- I'd like to suggest that
16 possibly Dr. Snow, and Mr. Logan might have something to
17 add to containment aspects for methanol.

18 Q Fine. Dr. Snow, have you
19 some recommendations to offer with respect to methods
20 of containing methanol water spill?

21 THE COMMISSIONER: Excuse me,
22 Dr. Snow, and Mr. Marshall, in your prepared paper,
23 Dr. Snow, you said that you understood Arctic Gas intended
24 to use methanol as a freeze depressant in the testing of
25 all pipelines north of sixty; that they would be ten
26 mile sections filled with a 26% methanol solution. Then
27 you said I believe this test spreads phase has now been
28 reduced to three miles. Is that so, Mr. Marshall?

29 MR. MARSHALL: I believe that's
30 so, sir. I think that's the evidence that Mr. Reid

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Cross-Exam by Marshall

1 gave. Dr. Files may remember.

2 THE COMMISSIONER: Dr. Files is
3 nodding yes, all right.

4 MR. MARSHALL: Well then there
5 can be no doubt, sir.

6 THE COMMISSIONER: Okay, sorry.
7 Carry on, I just wanted to be --

8 WITNESS SNOW: Thank you for that
9 clarification. So it is in fact a three mile spread that
10 we're dealing with, and therefore a volume somewhat in
11 excess of a million gallons of 26% methanol.

12 MR. MARSHALL: I think the
13 evidence was that as a maximum concentration, 26% methanol
14 would be used, and this is in the areas where the coldest
15 temperatures would be encountered. The percentage mixed
16 would decrease as one proceeded further south. If you
17 want to use that as the example, fine, in a three mile
18 test section.

19 A Yes. Well, I don't think
20 that I was envisaging permanent dams or dykes or barriers,
21 that are a specified frequency all the way along the
22 pipeline right-of-way. I'm mainly concerned that where
23 a particular spread backs onto a water body, whether this
24 be -- excuse me -- flowing water, or lake, and here, I
25 think, that something like a temporary earth berm, or
26 barrier, should be constructed, if there is any danger
27 that the whole solution contained in a three mile spread,
28 is in danger of being released into that water body.

29 Q Well, on that point, Dr.
30 Snow, and Mr. Pettigrew, you may have some knowledge on

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1 this point; my understanding is that with pressure
2 testing with a liquid, that almost immediately following
3 a break, pressure drops off very rapidly, because the
4 containers has burst, and it's a different situation than
5 one would get say, if one were testing with a gas, where
6 there -- the test medium would exit the pipeline almost
7 completely over a very quick period of time. With a
8 liquid test medium, once the break occurs, the pressure
9 drops off very rapidly, and the medium isn't discharged
10 very rapidly from that point on. Do you know, Mr.

11 Pettigrew, whether that's correct, from your experience?

12 WITNESS PETTIGREW: I think
13 generally, that's a fair statement.

14 Q And that further, with
15 respect to the release of ^{the} liquid test medium, one has to
16 look at the profile of the section of line being tested,
17 since it's a liquid it's not going to flow uphill, if you
18 like, and if your -- only a case where the break would
19 occur at the lowest point in the test section would you
20 likely find that all of the test medium were discharged.
21 Is that in accordance with your experience, Mr. Pettigrew?

22 A Yes, that's a fair statement.

23 Q I think, Dr. Snow, you were
24 going to outline the procedures that you thought ought
25 to be taken to protect watercourses given such a testing
26 operation going on. You mentioned some temporary dykes,
27 as I understand. Is there anything else?

28 WITNESS SNOW: Yes, I take your
29 point on considerations being given to the terrain
30 elevations and so on, and all of my concerns really stem

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1 from the consideration of the worst possible case. In
2 other words, if you have a spread sloping down to a river
3 crossing or down to a lake, and if the -- in Mr.
4 Pettigrew's slide this morning of an oil line seam well
5 failure , now say that were to occur ninety degrees
6 further around from his slide; in other words, on the
7 bottom of the pipe, and also down at the lower most end
8 of the testing spread; then you would get flow of the
9 contained solution into the pipe ditch; and obviously under
10 these conditions, it would be advantageous to have a
11 dyke at the end abutting onto the water body, to contain
12 that methanol.

13 The thing that I'm not clear
14 about with respect to the pipeline testing is whether
15 the applicant intends to backfill the three mile spread
16 after it's been filled with the test solution. In the
17 case of abutting directly onto water bodies, and part of
18 the protection of those water bodies, I would suggest
19 that this in fact was not done so that the pipe ditch
20 would in fact act as a containment area, for any
21 methanol should it be spilled.

22 Q My memory fails me at this
23 point and I can't recall the sequence of events as to
24 when the backfilling operation would take place --

25 MR. GOUDGE: We were
26 contemplating this yesterday, sir. I think it's after
27 backfill.

28 THE COMMISSIONER: It looks as
29 if Mr. Goudge is going to follow up on this anyway.

30 MR. GOUDGE:.. Well, I think the

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1 question's been asked sir, but we were starting in our
2 question from the supposition that testing took place
3 after backfill.

4 THE COMMISSIONER: After
5 backfilling?

6 MR. GOUDGE: After backfilling,
7 yes.

8 THE COMMISSIONER: That makes
9 more sense.

10 MR. HOLLINGWORTH: It seems
11 illogical to me, sir..

12 THE COMMISSIONER: It seems
13 illogical?

14 MR. HOLLINGWORTH: The point of
15 testing is to test for leaks, and if you find one, then
16 you have to dig it up.

17 MR. MARSHALL: There are no
18 leaks in pipelines.

19 (LAUGHTER)

20 THE COMMISSIONER: You can't
21 simulate reality unless you've got the thing filled
22 in -- well, none of us know.

23 MR. HOLLINGWORTH: I'll phone
24 Mr. Mirosh and ask him.

25 MR. BAYLY: Perhaps we should
26 somebody other than a lawyer to give this evidence, Mr.
27 Commissioner.

28 MR. MARSHALL: I believe, sir,
29 they have to test after, because some of the damage might
30 occur during the backfilling operation, and the passage

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1 of equipment over the line after it's gone into the
2 ground, so I think you're right, it takes place then.

3 MR. GOUDGE: Mr. Fraser said
4 they fill it in first, sir, and I think that's probably
5 so.

6 (LAUGHTER)

7 MR. MARSHALL: This is what
8 happens when we're abandoned by our technical advisors.

9 THE COMMISSIONER: Yes, they've
10 all fled. What time is it?

11 MR. GOUDGE:
12 It's 3:10 sir, it's
13 the middle of the afternoon.

14 THE COMMISSIONER: Well, all
15 right, let's adjourn for coffee.

16 (PROCEEDINGS ADJOURNED AT 3:10 P.M.)
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1 (PROCEEDINGS RESUMED AT 3:25 P.M.)

2 MR. MARSHALL: Sir, I gather
3 Mr. Hollingworth might be delayed --

4 MR. GOUDGE: Mr. Commissioner,
5 I think we might proceed. Mr. Hollingworth is talking
6 to Texas.

7 THE COMMISSIONER: All right.
8 Mr. Hollingworth told me at the coffee break that one
9 of his advisors, Mr. Ellwood, confirms that the methanol
10 testing is carried out after the backfill has been back-
11 filled.

12 MR. MARSHALL: Q Mr. Pettigrew,
13 we can carry on then. I wonder, sir, if you have had
14 a chance to examine the contingency plans that have been
15 set out in the Arctic Gas application?

16 WITNESS PETTIGREW: Yes, I have.
17 I have read that and my comment would be that if Arctic
18 Gas produces a contingency plan building in all the aspects
19 you should end up with a good plan. I liked what I read,
20 I think it's comprehensive and complete at this stage.

21 Q Mr. Pettigrew, some of
22 my advisors had I guess what we could call quibbles with
23 your treatment of some of the biological matters that
24 are set out in your evidence. I'm thinking of the
25 section starting on page 5 where you have a summary
26 of some areas sensitive to petrochemical spills and
27 you deal with an assessment of some of the biological
28 concerns. Would it be fair to say, sir, that when it
29 comes to an assessment of the environmental consequences
30 of the spills of toxic substances, you are a good

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1 geologist?

2 A That's an excellent summa-
3 tion of the situation.

4 Q Dr. Snow, Dr. McCart has
5 asked me to put a question to you which I understand
6 represents his view on the subject, and he wants to
7 know whether or not you agree with him. It's relating
8 to sedimentation which you deal with in your evidence.
9 If the source of sedimentation is not long-term, and if
10 it does not occur at or upstream and close to a critical
11 area for fish, for example a spawning area or an over-
12 wintering area, would you agree that the consequences will
13 not be significant to fish resources?

14 MR. BAYLY: I wonder if we could
15 have that term "significant" as it applies to fish
16 resources defined.

17 THE COMMISSIONER: Well --

18 MR. MARSHALL: I guess that was
19 my word.

20 THE COMMISSIONER: -- I don't
21 think that's possible . We went through that with Dr.
22 McCart but are we -- we're just talking about sediment
23 now.

24 MR. MARSHALL: Sedimentation,
25 yes sir.

26 THE COMMISSIONER: Nothing to
27 do with spills of fuel or oil or anything else.

28 MR. MARSHALL: No sir, sedimen-
29 tation.

30 THE COMMISSIONER: Well then,

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1 let's repeat that so I can get this thing.

2 MR. MARSHALL: If the source
3 of sedimentation is not long-term, and if it does not
4 occur at or upstream and close to a critical area such
5 as a spawning or overwintering area, then the consequences
6 of sedimentation will not be -- I use the term "signifi-
7 cant" to fish resources. You could substitute "of
8 serious consequence" to fish resources. Would you
9 agree with that statement?

10 WITNESS SNOW: In general I would
11 agree that the acute effects of siltation are not going
12 to be of great significance.

13 THE COMMISSIONER: Isn't that
14 a proposition that Mr. Stein and his colleagues would
15 likely have agreed with too?

16 MR. MARSHALL: I think that that's
17 probably so, sir. I know we've spent quite a bit of time
18 on sedimentation. Dr. Snow has done quite a bit of
19 work on it and I wanted to get some views from him.

20 Q I wonder, Dr. Snow, whether
21 or not your studies had related in general terms to the
22 effects of sedimentation or whether you had been concerned
23 with site specific impact assessment of possible sedimen-
24 tation effects of construction of the Arctic Gas Pipeline.
25 Have you been dealing with it in general terms, or have
26 you dealt with it on a site specific basis relating to
27 a gas pipeline?

28 A It was both really. We
29 had a very broad general ecological survey of the
30 effects of suspended sediment pretty well all over the

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Cross-Exam by Marshall

1 Mackenzie and Porcupine systems, and for experimental
2 purposes we concentrated on one river, this was the
3 Harris River near Fort Simpson. This is the limit of
4 our site specificity but we did not apply any kind of
5 critical siltation factor to every stream or river
6 crossing contemplated by the pipeline applicant.

7 Q The point I'm getting to,
8 Dr. Snow, is this that one can consider that sedimentation
9 is or is not a problem, depending on whether or not there
10 are fish resources close enough to the source of sedimen-
11 tation to be affected by it, and I was wondering whether
12 your work zeroed in on an identification of such areas
13 that, in your judgment, would be affected by sedimentation
14 that in your judgment was likely to take place as a result
15 of pipeline construction?

16 A Yes. We were more concerned
17 with food chain effects, the effects of suspended
18 sediment on fish food organisms rather than on either
19 the fish themselves or a particular part of their life
20 cycle such as spawning or migration. If the water shed
21 is degraded by excessive siltation, over any appreciable
22 length then it's reasonable to assume that a normal
23 fish migration would not take place along that section
24 of the river. If one of the reasons for the fish being
25 in that section was to feed, for example, our experiments
26 showed that there could be up to 30% depopulation of
27 the normal benthic invertebrates upon which fish would
28 feed in a section of river which had been subjected to
29 excessive siltation.

30 Q How large a section or reach

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1 of the river are you worried about?

2 A Well, for experimental
3 purposes this was just a few hundred feet. You can
4 look upon the effects of siltation -- well, it depends
5 on the amount of suspended sediment that is going
6 to be introduced as a result of a trenching operation,
7 for example, and the stage of discharge of the river.
8 If I may use an example, the Rengleng River last year
9 while the large culverts were being removed and their
10 replacements put in, I could detect suspended sediment
11 right away beyond at the point of entry of the Rengleng
12 to the East Channel of the Mackenzie, which is a distance
13 of some ten miles.

14 Q This is on the Dempster,
15 is it?

16 A That was a Dempster
17 Highway crossing, yes.

18 Q Were these suspended sedi-
19 ments in such quantity as to have a very serious effect
20 on benthic invertebrates? I believe you mentioned a
21 30% decrease in their numbers.

22 A They were some of our
23 experimental results on the Harris River. The conse-
24 quences to the benthos on the section of the Rengleng
25 that I looked at were far more severe than that.

26 Q Over how large a reach?

27 A From the Dempster crossing
28 to the East Channel, it's about ten, maybe 16 miles.
29 The river meanders a lot.

30 Q Have you identified

Snow, Pettigrew, Logan
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1 specific interactions that may occur on the Arctic Gas
2 Pipeline alignment where there, in your judgment, would
3 likely be sufficient sediment that you feel there would
4 be a significant impact on aquatic resources?

5 A Yes, the Great Bear River
6 was one on which we had a fair amount of concern.

7 Q Are there any others?

8 A Not that I can remember
9 specifically, no.

10 Q Well, perhaps if there are
11 and they come to mind, you could let me know through Mr.
12 Bayly.

13 A Yes indeed.

14 Q Do you have any reports
15 relating to your work on sedimentation that would be in
16 addition to those set out in the appendices to your
17 evidence?

18 A Can I just check exactly
19 what was in there?

20 Q That would take some time.
21 You could advise me through Mr. Bayly, that would be
22 satisfactory.

23 A Yes. The only sedimentation
24 reports, I think I included in my list of publications
25 so they are available in the total package here of the
26 evidence; but the sedimentation reports are not in the
27 list included at ^{the end} which I relied upon to prepare this
28 testimony.

29 Q Where are they included?

30 A After my curriculum vitae.

Snow, Pettigrew, Logan
Cross-Exam by Marshall

1 Q I see. So we have all of
2 your reports pertaining to sedimentation.

3 A They are listed, yes.

4 Q Yes. What about your work
5 with respect to methanol, are those all listed as well or
6 are there additional reports that are in preparation,
7 say?

8 A We have no specific
9 -- no experiments on the specific effects of methanol.

10 Q I see. I was looking at
11 your C.V. and I noted under "expertise" item 3,

12 "Impacts of toxic substances in water, i.e.
13 testing fluids, methanol, aero-phosphates, etc.

14 contributed to the PAAG Report,"

15 or have I got someone else's --

16 A No, I think you have a
17 previous draft of the evidence.

18 Q Well, do I understand that
19 this subject, that of the impact of toxic substances
20 in water, is within your field of expertise?

21 A That's right, that was in
22 an assessment capacity.

23 Q I see.

24 A There were three of us
25 contributing to -- we assisted one of the seconded
26 members of the Pipeline Assessment Group in the prepara-
27 tion of the section on impact of toxic substances in
28 methanol.

29 Q Yes. Have you done any
30 experimental work in that area?

Snow, Pettigrew, Logan
Cross- Exam by Marshall

1 A No, I haven't.

2 Q There was a statement in
3 your evidence that appears on page 19, you say in the
4 middle of the first paragraph:

5 "4% solution will adversely affect fish eggs
6 and probably also benthic invertebrates."

7 I was wondering what research it was that you were
8 relying on in support of that statement? Have you
9 found the passage?

10 A Oh yes, yes, I've found it.
11 Primarily Dr. McCart's, in Volume 15, I believe, of the
12 support series for the application, and several other
13 papers of which I have copies that have been specific
14 bio-assay work on benthic invertebrates and zooplankton.

15 Q I understand that Dr. McCart's
16 firm has additional research going on into this subject.
17 Are you familiar with the progress that's being made?
18 Are you keeping in touch with that?

19 A Yes, I am.

20 Q Dr. Snow, you are aware
21 that the plan would see testing, pressure-testing the
22 pipeline done during the wintertime.

23 A Sorry, could you repeat
24 that?

25 Q You are aware that the
26 construction plan would see pressure-testing of the
27 pipeline done in the wintertime?

28 A Yes.

29 Q I wondered whether in your
30 studies in this region you had identified any fall

Snow, Pettigrew, Logan
Cross-Exam by Marshall

1 spawning areas that, in your judgment, were close
2 enough to the proposed pipeline route that they might
3 be affected in the event that there were a methanol
4 spill during pipeline testing?

5 A No, I haven't identified
6 any ^{fish} spawning areas at all.

7 MR. MARSHALL: Those are all
8 the questions I have, gentlemen. Thank you.

9 THE COMMISSIONER: Could I ask
10 you, Dr. Snow, a couple of questions?

11 Q If you would turn to page
12 12, you -- under the heading,

13 "General concerns"
14 you said, the second sentence:

15 "Until an oil pipeline down the Mackenzie
16 Valley is proposed, I consider the main threat
17 to aquatic systems above the delta the main
18 threat from the construction of a gas pipeline,"
19 That's what we're talking about.

20 "posed by ^{pipeline} petrochemicals to be fuel spills
21 from on-land storage sites or during transfer
22 by pumps or trucks, and spills of pipeline
23 test fluid (methanol) either during the testing
24 process or during transfer of storage. Spills
25 of even small to moderate quantities of fuel
26 into any of the relatively productive clear
27 flowing eastern draining tributaries of the
28 Mackenzie to be crossed by the gas pipeline
29 are likely to cause impoverishment of the down-
30 stream areas similar to that seen in our Caribou

Snow, Pettigrew, Logan
Cross-Exam by Commissioner

1 Creek, Caribou Bar Creek oil spill experiment."

2 What's this eastern draining? I assumed these were
3 tributaries on the east side of the Mackenzie, but
4 "eastern draining" has thrown me off a bit.

5 A No, I'm sorry, it's
6 probably my terminology. I mean the eastern flowing
7 tributaries flowing into the Mackenzie from the east.

8 Q From the east?

9 A Right.

10 Q Because of course it doesn't
11 really cross any tributaries from the west until somewhere
12 south of Fort Simpson.

13 A That's right.

14 Q Now, in the Caribou -- and
15 then you discussed this Caribou Creek oil spill
16 experiment -- you say,

17 "A small quantity of crude oil was discharged
18 into this creek."

19 What was the quantity?

20 A Two barrels, 90 gallons.

21 Q Two barrels, 90 gallons,
22 and --

23 A That's Imperial gallons.

24 Sorry, they were two drums provided by Imperial.

25 (LAUGHTER)

26 Q Well, you've discussed
27 that experiment at some length and it's very interesting.
28 How -- is there any way you could tell us the size of
29 Caribou Bar Creek, its flow or anything of that sort?
30 Is it a stream or creek?

Snow, Pettigrew, Logan
Cross-Exam by Commissioner

1 A Yes, I do have these
2 figures. I don't have them off the top of my head. It's
3 probably equivalent to -- I'm sorry, I don't know what
4 rivers you would be familiar with.

5 Q Well, that probably
6 wouldn't work very well,

7 A But in terms of fordibility
8 it's probably about two or three-foot deep in late
9 spring and it's about 10 to 15-foot wide in its upper
10 reaches, has a moderate discharge of several hundred
11 C.F.S.

12 Q And you discharged -- you
13 discharged the oil at what time of year into the creek?

14 A This was in the late
15 summer, August '72.

16 Q So the flood is in June,
17 is it, and you discharged the oil into the creek in
18 August. It wouldn't have been two or three feet deep in
19 August then.

20 A Oh yes, it was, in peak
21 discharge it's totally impossible to ford it when it's
22 six or seven feet deep, and it has a relatively enormous
23 discharge.

24 Q When you did this experiment,
25 it was two to three feet deep.

26 A That's right, yes.

27 Q And at the bottom of page
28 18, discussing methanol, you said -- the last sentence on
29 18 you said:

30 "The greatest impact of a methanol spill during

Snow, Pettigrew, Logan
Cross-Exam by Goudge

1 a test would occur if all the fluid entered a
2 low discharge in clear river such as most of the
3 eastern tributaries of the Mackenzie which has
4 flow under the ice during the winter."

5 Well, that's self-evident. I had a question mark beside
6 it, I don't know why now.

7

8 THE COMMISSIONER: Mr. Goudge?

9

10 CROSS-EXAMINATION BY MR. GOUDGE:

11 Q Mr. Snow,
12 I wonder in relation
13 to the Caribou Bar Creek ^{experiment} whether that is covered in one
14 of your reports? I take it it is.

15 A Yes, there are two reports
16 on the subject.

17 Q I wonder if you might
18 through Mr. Bayly provide us with those reports which I
19 take it would have the detailed statistics as to flow
20 rates and so on?

21 A Yes, that's true. I thought
22 they were already provided, but if they're not I certainly
23 will --

24 Q I think it would be helpful
25 to us if we could have them filed as exhibits. I'm sure
26 they've been available on a number of lists, but they
27 haven't been formally filed as exhibits. Perhaps you
28 could tell Mr. Bayly which they are and we could make
29 arrangements to have those two reports filed as exhibits.

30 A Yes, of course.

Q Mr. Pettigrew, I

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Cross-Exam by Goudge

1 have one or two short questions for you, sir, on your
2 prepared evidence. You say at page 1 of your prepared
3 evidence that,

4 "Statistics reveal an annual spill rate in United
5 States of about 13,000 spills of oil substances
6 per year over the last five years."

7 Do you have any knowledge, sir, as to how many of those
8 spills arise out of drilling situations and how many would
9 arise out of pipeline construction situations?

10 WITNESS PETTIGREW: I can give
11 you an answer to part of your question, I think. Out
12 of the -- from the 13,000 per year, and these 13,000 per
13 year, they total approximately 20 million gallons of oil,
14 a few statistics on this, one-half of these are less
15 than 100 gallons. Now specifically pipeline spills of
16 that total number would run about 500 per year.

17 Q That would be pipeline
18 breakages, I take it.

19 A Yes. Totalling about one
20 million gallons.

21 Q Do your statistics show
22 the number and volume of spills in connection with
23 pipeline construction as opposed to pipeline breakage?

24 A I have no information on
25 that.

26 Q What about in connection
27 with the drilling of wells, do your statistics show that?
28 Blowouts, spillages around drilling operations and so on.

29 A No.

30 Q The statistics don't reveal

Snow, Pettigrew, Logan
Cross-Exam by Goudge

1 that either?

2 A No, they do not.

3 Q I see. On page 8 of your
4 evidence then you refer to contractors being expected by
5 government to have appropriate emergency organizations.
6 I take it that's a matter of compulsion, government
7 would require that.

8 A I believe this is true, that
9 there is nothing mandatory on this, but the Fisheries
10 Act and a number of other Acts make provision for, the
11 Minister can ask for plans which, of course, would include
12 contingency plans.

13 Q In your view, should it
14 be mandatory?

15 A Yes indeed.

16 Q On page 9, sir, you refer
17 to certain policy questions that have to be answered by
18 the company concerned, and you were asked by Mr. Holling-
19 worth for certain matters related to cleanup staff being
20 either in-house or alternatively independent contractors.
21 Which is your preference? Which is the better policy?

22 A I think the company
23 involved.

24 Q In-house.

25 A Yes. I believe that to be
26 true.

27 Q On page 13 of your evidence,
28 sir, you talk about regularly scheduled inspections and
29 I wonder if you have any rule of thumb as to the time
30 involved, how often should pipeline facilities be

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Cross-Exam by Goudge

1 regularly inspected?

2 A I believe pipelines should
3 be inspected on fairly frequent bases.

4 Q Are you speaking there of
5 once every six months, or more frequently?

6 A No, far more frequently
7 than that. From the point of view of flying a pipeline
8 route, an example would be that I know of at least a few
9 spills in the past two or three years in Canada where
10 flying lines have on a weekly basis have provided evidence
11 of spills, at least one that I can be sure of. So I think
12 that that is somewhat of a standard procedure by
13 some pipeline companies, and I believe in that. Other
14 inspection techniques -- and I'm not too up on this but
15 I believe these are carried out at ^{fairly} frequent intervals
16 such as corrosion tests and that sort of thing.

17 Q Without worrying about the
18 operating pipeline, sir, what about inspection of things
19 like tank farms that's to be done in some unautomat^{ed} way?
20 How frequent should that kind of inspection be?

21 A Well, these should be
22 inspected certainly with some thoroughness.

23 Q I take it you'd recommend
24 something in the order of a weekly inspection.

25 A Certainly I would.

26 Q You refer to automated
27 alarm systems for things like tank farms, and I take it
28 from your reference that that kind of device exists and
29 is serviceable in the north.

30 A Yes.

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1 Q And you know, I presume,
2 of cases where that kind of system is in present
3 operation in the north?

4 A Right.

5 Q Then on page 14, sir, you
6 refer to periodic mock exercises. I take it you and Dr.
7 Snow are referring to the same thing and would you agree
8 with him that twice a year would be the kind of timetable
9 you'd look for in dealing with mock exercises?

10 A I would say that would be
11 a minimum, because I believe there should be such exer-
12 cises in different seasons of the year and two a year
13 don't necessarily cover all the differences.

14 Q I see, so your rule of
15 thumb would be higher than two a year.

16 A Up to four.

17 Q On page 15 you deal with
18 the use of booms to deflect oil if river flow velocities
19 are high. I take it, though you and Dr. Snow share the
20 same concern about the use of booms in high velocity
21 situations so that that technique may not be viable
22 in all cases.

23 A That's right.

24 Q And unfortunately, as I
25 understand all of you, there appears to be no satisfactory
26 way of controlling oil spills in that circumstance, in
27 the high velocity circumstance.

28 A That's correct.

29 Q Then on page 18, sir, you
30 refer to disposal at pre-selected government approved

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Cross-Exam by Goudge

1 permanent land disposal sites of contaminated material.

2 I take it it's your view that it's the government's
3 obligation to begin to identify such areas. Is that so?

4 A Yes, that's so.

5 Q Yes, and do you know whether
6 that task is under way or if there's any plan for it to
7 get under way?

8 A This has been discussed
9 with authorities in the Northwest Territorial Government
10 and I believe that they are looking at that.

11 Q I suppose what you mean is
12 they're developing site criteria.

13 A I can't be sure they're
14 developing it. They're aware of the need to do so.

15 Q I take it, though, in your
16 view this is a task which government must undertake prior
17 to the commencement of any large scale pipeline operation.

18 A Correct.

19 Q And finally, sir, on page
20 18 you refer to -- and you've referred in answer to some
21 of my friends to recognized contaminated soil restoration
22 experts. That's, I take it, a relatively specialized
23 breed of animal, but they exist.

24 A They do exist.

25 Q Yes. What kind of training
26 goes into producing that kind of expert? Is it simply
27 experience?

28 A No, I think it's more. I
29 think -- maybe, Dr. Snow, you can help me out.

30 Q Well, let me ask you this,

Snow, Pettigrew, Logan
Cross-Exam by Goudge

1 you referred this morning in giving us your case history
2 to people who dealt with the restoration of agricultural
3 land, and so there's the southern variety of such expert.

4 A Right.

5 Q Do they exist for the
6 north as well?

7 A I'm not sure. I would assume
8 that the discipline that we talked about that exists
9 in the south would have some application in the north,
10 but I haven't quite met one of those people.

11 Q Dr. Snow, do you have
12 any comment on that? I didn't mean to cut you off.

13 WITNESS SNOW: Sorry, I have
14 no knowledge of that type of person.

15 Q Now, Mr. Pettigrew, you've
16 told us in some very helpful detail about the kind of
17 equipment that exists for the mop-up of fuel spills or
18 oil spills in a mechanical sense. I take it you'd agree
19 with me that when we speak of booms or absorbants or
20 skimmers or vacuum pumps we 're speaking of equipment
21 that has been tried in the south but is relatively untried
22 in northern conditions.

23 WITNESS PETTIGREW: That is
24 correct.

25 Q And I take it that you
26 and perhaps Dr. Snow and Mr. Logan as well agree that
27 in northern conditions where we have ice situations,
28 breakup situations, and fragile tundra, you have some
29 doubts about the efficiency of these mechanical devices
30 in the north.

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1 A That is correct.

2 Q Mr. Logan, would you concur
3 in that? And Dr. Snow?

4 WITNESS LOGAN: I would.

5 WITNESS SNOW: Yes.

6 Q Mr. Logan, in your experience
7 you've spoken about one or two new areas in which equipment
8 may be in the process of development. I think you referred
9 particularly to booms that may withstand ice. Is there
10 any other area in which you see mechanical equipment
11 being developed to cope with the kinds of northern
12 problems that spill and cleanup operations in the north
13 face?

14 WITNESS LOGAN: You're specific-
15 ally referring to equipment, not techniques?

16 Q Well, let's begin with
17 equipment.

18 A No, this is a tentative
19 start which has just begun, which I referred to this morn-
20 ing.

21 Q What about techniques?
22 Are there any techniques on the horizon which may assist
23 this problem?

24 A They are looking at --
25 right now we're in the realm of conjecture and we have
26 to look at all the techniques and start eliminating them
27 as some are pie-in-the-sky type of approaches. It's a
28 completely new area and we're starting at baseline zero.

29 Q So we're really on the
30 frontier of technology.

A Right..

Snow, Pettigrew, Logan
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1 Q Now then, Mr. Pettigrew,
2 in preparing this detailed contingency plan that you've
3 provided us with, you see it, as I understand it, as
4 a company team plan. Is that correct?

5 WITNESS PETTIGREW: Yes, I'd
6 like to add that I see this as a step toward the
7 development of guidelines as to what contingency plans
8 should contain; but also I would agree with your statement
9 it's that as well.

10 Q Yes; and you've been asked
11 by my friends as to its applicability to the construction
12 and operation of a pipeline. I take it you would say
13 that such a plan is obviously necessary during the
14 construction phase of a gas pipeline.

15 A Yes.

16 Q And I take it you would
17 also say it's necessary during the operations phase of
18 a gas pipeline.

19 A Yes, definitely.

20 Q To be fair though, I
21 assume you would say or agree with me that the size of
22 the team necessary is substantially greater in the con-
23 struction period than in the operation period.

24 A Correct.

25 Q In either case, though
26 you propose a team that is drawn from company employees.
27 Is that so?

28 A Yes.

29 Q Yes. Your plan nonetheless,
30 as I read it, has built into it the possibility of

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Cross-Exam by Goudge

1 co-ordination with other companies in the industry and
2 in the area.

3 A Yes.

4 Q I take it your reason for
5 that is that circumstances may arise where a spill goes
6 beyond the capacity of one company's team to deal with it.

7 A Right.

8 Q In other words, to guard
9 against a big spill you may need a contingency plan that
10 takes in employees and teams of more than the single
11 company.

12 A And even including govern-
13 ment resources.

14 Q Yes. Well I'm coming to
15 that because as well at the end of your paper I understood
16 you to say that government has some responsibility to
17 see that there is a team available in the case that the
18 spiller is unknown or unwilling to clean it up.

19 A Right.

20 Q So that it's your view, as
21 I understand it, that the company should have a contingen-
22 cy plan team and as well government should have available
23 to it some backup contingency plan team. Is that so?

24 A Yes.

25 Q In that circumstance,
26 let me ask you if you've given any thought to this, because
27 of the duplication that you suggest is perhaps necessary,
28 that is companies having to have contingency plan teams
29 and government having a backup contingency plan team,
30 and secondly because of the need under certain circumstances

Snow, Pottigrew, Logan
Cross-Exam by Goudge

1 for a team that goes beyond the capacity of a single
2 company, have you given any thought to the necessity of
3 regionalizing contingency plan teams so that they would
4 be manned by employees from a variety of companies and
5 government?

6 A Yes. Regionalizing this
7 kind of team is very definitely part of a plan.

8 Q Would it not be preferable
9 to meet the two objectives or to meet the two considera-
10 tions that I outlined, to take the contingency plan
11 process out of the hands of the individual company and
12 regionalize it as is done in southern areas for
13 fire-fighting? Is there any merit in that suggestion?

14 A This would not eliminate
15 the company -- the very heavy company involvement. Your
16 suggestion would not eliminate the company involvement,
17 would it?

18 Q Well, my suggestion would
19 result in the creation of, for example, the Inuvik and
20 delta contingency plan team involving participation from
21 a variety of companies, perhaps from government, but a
22 regional team rather than a team under the auspices of
23 a single company.

24 A Yes. I think this is the
25 concept. I believe you stated it probably more clearly
26 than I did. This is the approach. It is not purely a
27 company contingency planning organization. But it's
28 intimately linked with government and agency organizations
29 as required.

30 Q Your proposition, as I

Snow, Pettigrew, Logan
Cross-Exam by Goudge

1 understand your evidence, puts the primary responsibility
2 on the specific company with its employees manning the
3 team, but with possibilities of co-ordination with other
4 companies.

5 A That is correct.

6 Q Yes. My suggestion -- and
7 I'd like your views on it -- would result in the creation
8 of a contingency plan team that is not under the auspices
9 of any single company but provides contingency planning
10 for all spills in a given region.

11 A Yes, as far as my views on
12 it are concerned this is -- you're approaching the co-op
13 type of organizational structure, and there's no reason
14 but that this can function.

15 Q Would you see it to be
16 preferable, given the size of the proposed pipeline and
17 construction operation we're dealing with? Or would you
18 still prefer the company -- the contingency plan team to
19 be under the auspices of the pipeline company?

20 A I think the latter, Mr.
21 Goudge.

22 Q Perhaps you could tell me
23 why, briefly.

24 A I believe it is primarily
25 the company's responsibility to develop an adequate
26 contingency plan for facilities such as we're discussing,
27 and they have, in case of a break, they have -- respon-
28 sibility is very heavily upon the operator. They can
29 get any amount of help from other organizations, govern-
30 ment agencies and so on.

Snow, Pettigrew, Logan
Cross-Exam by Goudge

1 Q I see.

2 A That's the emphasis that
3 I would see on it.

4 Q Before I leave the subject,
5 do you know whether in the valley area the governmental
6 authorities have in mind the development of the kind of
7 government contingency plan team that you speak of as
8 necessary to back up the company contingency plan team?

9 A Yes. You speak of the
10 Mackenzie Valley Pipeline. Let me see if I understand your
11 question.

12 Q Well, sir, let me take it
13 step by step. You told us that in your view it's necessary
14 for government to have a backup contingency plan team to
15 fill in if the spiller is unknown, or reluctant to clean
16 up. That being so, is that kind of government contingency
17 plan team in the works?

18 A Yes.

19 Q For the Mackenzie Valley
20 area?

21 A Yes. Under, incidentally
22 under the jurisdiction, if you will, of the Northwest
23 Territorial Government, in this case Mr. John Parker,
24 Deputy Commissioner.

25 Q Without worrying about the
26 specifics, sir, I take it in your view it's necessary
27 that that government backup team be ready and able before
28 the pipeline project goes ahead.

29 A Necessary indeed.

30 Q Finally, sir, you spoke at

Snow, Pottigrew, Logan
Cross-Exam by Goudge

1 the end of your paper about the roles of government
2 agencies concerned, and the conclusion I draw -- and you
3 tell me if as a layman it's a fair conclusion -- is that
4 there is some complexity involved in assigning responsi-
5 bility within government for any particular spill or
6 for any particular spill cleanup properly.

7 A Complexity?

8 Q Well, let me ask you to
9 agree that it's complex in light of the fact that in
10 certain cases the Department of Indian Affairs appears
11 to be the leader in responsibility; in other cases, the
12 Department of the Environment; in other cases, the
13 Ministry of Transport; in other cases, the Territorial
14 Government. In that sense it's complex.

15 A Yes, to a degree that's
16 complex.

17 Q I wonder if as a contingency
18 plan expert you would think it preferable for government
19 to have a single point of responsibility for all spill
20 cleanups north of the 60th Parallel? Would that be
21 preferable than having the present split up responsibility?

22 A Well, a single aspect is,
23 I think it's there in view of the fact if we have a
24 single on-scene commander to co-ordinate the functions
25 of these various entities.

26 Q Isn't it true, though, that
27 if a spill occurs in the north you first have to insofar
28 as government responsibility is concerned, go through the
29 process of assigning responsibility in deciding which of
30 the four agencies I outlined takes command. Isn't that so?

Snow, Pettigrew, Logan
Cross-Exam by Goudge

1 A That's so. It's usually
2 rather apparent, depending on where the spill is.

3 Q Yes. I wonder whether
4 there's any merit in considering the preferability of
5 having one government responsibility point regardless
6 of where the spill occurs in the north.

7 A It has great merit.

8 Q Dr. Snow, let me turn to
9 you, if I may, for a few moments and ask you to turn
10 to the last page of your prepared evidence where you
11 provide some recommendations as a result of your
12 evidence. You speak first of the high priority necessary
13 to early detection of spill incidence. Now I take it
14 you'd agree with Mr. Pettigrew who says that the first
15 hour or two of any spill is critical?

16 WITNESS SNOW: Most definitely.

17 Q You then go on to recommend
18 the training of conscientious operators and supervisory
19 personnel, and I wonder whether you're aware of either
20 the Department of the Environment or your department or
21 government in general having any specifications extent
22 for the training or retraining or practicing of contingency
23 plan teams?

24 A No, I do not believe that
25 such regulations or specifications exist.

26 Q I take it in your view,
27 though it would be desirable that such be prepared.

28 A Yes, it would.

29 Q Your second recommendation,
30 sir, deals with the dyking question that Mr. Marshall

Snow, Pettigrew, Logan
Cross-Exam by Goudge

1 reviewed with you. I take it that you're familiar with
2 the Department of Environment study entitled:

3 "Review of Petroleum Spill Containment Dykes
4 in the North."

5 A I have seen it, yes.

6 Q Yes. I'm going to ask that
7 It contains some helpful information.
8 this be filed. / In particular, this study indicates
9 that as you say permeability has been a problem. Do you
10 have any views on the solutions to that problem?

11 A Either synthetic materials
12 could be used like polyurethane liners or in certain
13 locations it may be possible to encourage the development
14 of permafrost up into the berm. I think this has already
15 been done in some cases, and this could be probably en-
16 hanced by spraying silt or water into the berm during
17 construction.

18 Q There are two techniques.
19 Is that as far as your views can take us?

20 A Well --

21 Q Any others, in other words?

22 A Well, yes, the whole thing
23 could be constructed out of concrete or steel.

24 Q Is that practical?

25 A I doubt very much, I think
26 it would be prohibitively expensive.

27 Q Yes.

28 A I don't think concrete would
29 be too appropriate in many locations in the north either.

30 Q So I take it if you had a
preference for the future of research to increase the im-

Snow, Pettigrew, Logan
Cross-Exam by Goudge

1 permeability of dykes, it would be in the area of things
2 like plastic liners.

3 A Yes, yes, that's correct.

4 Q Now, as a related matter
5 to dykes, Dr. Snow, I take it there is also a problem
6 in your view concerning a permeability problem, if you
7 will, in connection with sumps that exist in the delta
8 area.

9 A There may be in areas of
10 very high ice content, yes.

11 Q Once again, it's the high
12 ice content that causes the problem.

13 A That's right, yes.

14 Q Do you have any views on
15 ways of alleviating that problem?

16 A Not really. This is a
17 subject of an A.P.O.E. Report very soon, probably by the
18 end of this month or early March, where all of these
19 problems of sump integrity are to the best of my know-
20 ledge being thoroughly investigated, have been thoroughly
21 investigated.

22 Q And do you know whether or
23 not that report gets into the area of solutions to the
24 problem?

25 A I have been told that
26 solutions are put forward in that report,

27 Q But you can't tell us
28 what they are and you have no opinions other than that
29 as to what solutions might be available?

30 A Not really. I haven't seen

Snow, Pettigrew, Logan
Cross-Exam by Goudge

1 any draft of that report.

2 Q Now, your third recommenda-
3 tion, sir, deals with oil spill containment and cleanup
4 technology, research and development. While that's
5 been thoroughly canvassed, let me deal specifically with
6 you on your worst case situation of a spill in the valley
7 and that's, I take it, a spill at breakup. Is that so?

8 A That's right, yes.

9 Q And your view is that
10 present technology couldn't handle such a spill.

11 A It could not effectively
12 contain it and clean it up, no.

13 Q Can you assist us, or add
14 anything to Mr. Logan as to what kind of developments
15 are realistically anticipateable for that kind of spill?

16 WITNESS LOGAN: Within a month
17 there will be a test program under way.

18 Q Sorry, I meant -- I don't
19 mean to cut you off, Mr. Logan, but I was asking Dr. Snow
20 if he had anything to add to what you told us earlier.

21 WITNESS SNOW: All I can hope is
22 that the technology in the development of larger booms
23 which can withstand ice conditions shows the most promise.
24 I am sure Mr. Logan can enlarge on that.

25 Q Yes, Mr. Logan, I didn't
26 mean to cut you off.

27 THE COMMISSIONER: He said
28 something was going to happen within a month.

29 MR. GOUDGE: Yes.

30 THE COMMISSIONER: You've got us

Snow, Pettigrew, Logan
Cross-Exam by Goudge

1 all on edge here.

2 WITNESS LOGAN:

3 No, the problem does exist in Southern Canada too.
4 I mentioned the St. Clair River earlier. We are going out
5 in co-operation with the United States Coastguard to
6 see if a preliminary study on a barrier which will
7 deflect ice but will let oil pass through so it can be
8 contained ^{and} /a containment boom is effective. But as I
9 say, this is still in the planning stage, of development
10 stage.

11 MR. GOUDGE: Q Now, Mr. Logan,
12 you've told us a good deal about dispersants and your
13 views on them, and I take it you're familiar with the
14 guidelines on use and acceptability of oil spill
15 dispersants, a document I'm holding in my hand. Once
16 again, sir, I would like to have this marked as an exhibit.
17 I think it would be helpful just to try to rescue dis-
18 persants from their present low position on the totem
19 pole, Mr. Logan, let me read to you one paragraph from
20 this report and ask whether it conforms with your
21 views or whether the department holds different views.
22 I quote as follows:

23 "Environment Canada wishes to encourage further
24 development in dispersant formulations, applications
25 and mixed methods and evaluation procedures, and will
26 consider revising various aspects of parts of the
27 present guidelines as new basic knowledge and
28 technology becomes available."

29 I take it you'd agree that the department at least has
30 not dismissed totally out of hand the future of dispersants.

Snow, Pettigrew, Logan
Cross-Exam by Goudge

1 A No.

2 Q So your views relate, I
3 take it, to the present state of technology regarding
4 dispersants.

5 A Right.

6 Q One other way of getting
7 rid of oil at least getting it off the surface is the
8 use of sinkants. Is that an area that, in your view, is
9 worthy of any further research; or do you feel about it
10 much as you feel about dispersants?

11 A There is a report in
12 preparation in Ottawa at the present time which will
13 recommend sinking agents, not be used.

14 Q Why is that, sir?

15 A They cover the bottom and
16 destroy the bottom fauna.

17 Q So that sinkants are
18 perhaps even below dispersants on the totem pole.

19 A Well, dispersants stay on
20 the water ^{column} and the sinkants will go below.

21 THE COMMISSIONER: But you get
22 back to mechanical means, essentially.

23 A Essentially the optimum
24 would be to physically remove the oil from the water
25 and dispose of it so it does not get under the water
26 column or have anything to do with biotic life.

27 MR. GOUDGE: Q In your view,
28 the future of dispersants is gloomy; the future of
29 sinkants is totally negative.

30 A In Canada.

Snow, Pettigrew, Logan
Cross-Exam by Goudge

1 THE COMMISSIONER: And in the
2 Arctic.

3 MR. GOUDGE: That includes the
4 Arctic.

5 THE COMMISSIONER: The Mackenzie
6 Valley and the Arctic particularly, I should have thought.
7 Or do you make any distinction there?

8 A Well, the Mackenzie Valley
9 is freshwater and the Arctic is salt.

10 MR. GOUDGE: Q I'm sorry, I
11 didn't hear that, sir.

12 A I said the Mackenzie
13 Valley is freshwater.

14 Q How does that affect your
15 judgment?

16 A The general rule of thumb
17 which is operating in the government right now is not
18 to use dispersants on freshwater.

19 THE COMMISSIONER: O', you've
20 reserved it as a last resort in salt water.

21 A Right.

22 THE COMMISSIONER: I follow you.

23 MR. GOUDGE: Q Sinkants, though,
24 I take it, are in your view totally undesirable both
25 in freshwater and salt water.

26 A Right.

27 Q And while there may be
28 future research to be done in the area of dispersants,
29 none is in your view on the horizon for sinkants.

30 A That is correct.

Snow, Pettigrew, Logan
Cross Exam by Donlin

1 Q Now, two other devices that
2 you spoke of were surface curtains and underwater domes.
3 You described surface -- or perhaps Dr. Snow described
4 them to us. I take it, Mr. Logan, they are containment
5 devices.

6 A Yes.

7 Q Are you familiar with either
8 of them?

9 A The underwater dome is a
10 concept which was put forward in the Beaufort Sea tech-
11 nical report as a possibility for future research, whether
12 we can contain the oil under the water as a result of
13 a leak from a pipeline or a leak from a well.

14 THE COMMISSIONER: These are
15 just ideas in the minds of the experts. Is that the
16 situation?

17 A Well, not just ideas, sir.
18 In the American States, Southern States where they do
19 have some underwater battery lines, plastic domes are
20 inserted above the break to contain the oil. They also
21 use them down in some of the leakages from the faults
22 around the Santa Barbara area.

23 Q And so your principal
24 problem then would be installing it, climatic conditions
25 might make that difficult.

26 A Well, if you're offshore
27 of the sea it's ^avery benign area once you go below it,
28 it's constant. It's a matter of developing the techniques
29 to install the materials and in the case of an offshore
30 blowout, the volumetric capacity and also getting rid of

Snow, Pettigrew, Logan
Cross-Exam by Goudge

1 the gases so you can contain the oil. The ideas are
2 still being generated.

3 MR. GOUDGE: Q I take it research
4 is under way, if not in Canada, elsewhere in the world,
5 on that, on domes ^{as a} containment device.

6 A No, we're looking at it
7 very seriously as an area in which we can have some
8 input.

9 Q There is no available
10 dome device, though, that could be put into immediate
11 operation.

12 A Here?

13 Q Yes.

14 A No.

15 Q And you're familiar, I
16 take it, with Canmar's reaction to the suggestion which
17 was that there wasn't sufficient known about it technolo-
18 gically to make it anything more than a handicap to
19 drilling. Are you familiar with Canmar's position on
20 domes?

21 A No, I can't say that I am.

22 Q Are you, Dr. Snow?

23 WITNESS SNOW: Yes, I agree with
24 that.

25 Q Yes.

26 A What I was indicating here
27 was that these structures as they currently exist or like
28 the ones that were used, ineffectively, I might add,
29 for the Santa Barbara containment, not that these are
30 adequate to be used at present, but that they may show

Snow, Pettigrew, Logan
Cross-Exam by Goudge

1 some potential for research and development in the
2 future.

3 Q Yes. Why did you say that
4 they were ineffective at Santa Barbara?

5 A I don't know why they were
6 ineffective, but in one of the reports it stated that
7 steel cones were put in place but they did not effectively
8 contain the oil, possibly because a lot of the oil was
9 seeping from cracks too far removed from the well head
10 to be effectively contained by such device.

11 Q I see.

12 A But that's just a guess on
13 my part.

14 Q That's conjecture. You have
15 no knowledge of why the dome was ineffective.

16 A No.

17 Q As to surface curtains,
18 Mr. Logan, isn't it so that Pan-Arctic is at present
19 using surface curtains around their drilling in the
20 high Arctic?

21 WITNESS LOGAN: I'm not familiar
22 with the latest Pan-Arctic technology, Mr. Goudge. I
23 couldn't answer that question.

24 Q Do you know that, Dr. Snow?

25 WITNESS SNOW: Repeat the question.

26 Q Well, I am advised that
27 Pan-Arctic is either using or has been instructed to use
28 surface curtains as a containmant device in their drilling
29 in the high Arctic.

30 A I've heard that it was

Snow, Pettigrew, Logan
Cross-Exam by Goudge

1 suggested but I'm not aware that they were actually using
2 them.

3 Q Now on page 14 of your
4 evidence, Dr. Snow, you talk about the difficulty of
5 on-land cleanup, given a summer storm surge, and the
6 manpower requirements that would be necessary under
7 certain circumstances, and you say that,

8 "No contingency plan you know of addresses that
9 problem."

10 If you were going to address it, what would you put into
11 a contingency plan?

12 A For on-land cleanup?

13 Q Yes.

14 A In the Beaufort Sea area,
15 I would possibly suggest in most of those sensitive
16 areas that it be left alone; but if there were any cleanup
17 to be contemplated it had to be much the same as the
18 measures followed in the "Mizushima" cleanup which was
19 just large amounts of manpower with simple equipment
20 such as tea strainers on the end of poles and rigs.

21 Q Isn't it so that that is
22 the terrible problem presented by an on-land oil spill
23 in the delta, large, very large numbers of manpower are
24 required?

25 A Yes, of course.

26 Q And I presume you'd agree
27 that a spill on such land on the snow in the winter
28 might present even more complicated a problem.

29 A Only inasmuch as you have
30 the additional climatic factor to contend with.

Snow, Pettigrew, Logar
Cross-Exam by Goudge

1 Q Now, the fourth recommenda-
2 tion you make refers to environmental monitoring, and
3 I wonder whether you have any monitoring programs in mind,
4 what kind of programs are you speaking of?

5 A These would be routine
6 water quality and selected biological parameter monitoring
7 programs which would follow the pipeline construction,
8 operation and maintenance phases to be in an early posi-
9 tion to detect any adverse changes, so that remedial
10 measures could be instituted with the minimum delay.

11 Q I take it you'd agree that
12 those programs should properly begin even before construc-
13 tion.

14 A Yes, that's true, in a way
15 I suspect that most of them have with the Mackenzie
16 Valley Pipeline program.

17 Q You'd be satisfied with that
18 as pre-construction monitoring.

19 A Well, I suspect that the
20 amount of effort that was expended in that particular
21 program would not be matched by a monitoring program
22 subsequent to the end of the original program.

23 Q And your last recommendation,
24 sir, relates to the problems of hot water -- or the
25 problems of methanol testing, and the possible use of
26 hot water testing, and I understood you to say in answer
27 to one of my friends that one of the contingency plans
28 you would like to see in connection with methanol testing
29 is testing in the open ditch.

30 A That's correct.

Snow, Pettigrew, Logan
Cross-Exam by Goudge

1 Q I take it that you would
2 like to see testing in the open ditch where that ditch
3 obviously has breakers, breaking it into short sections.

4 A Yes.

5 Q If you had that kind of
6 contingency, wouldn't that kind of testing be preferable
7 to hot water testing?

8 A Yes, it would.

9 Q Now, let me ask you to go
10 to page 13 as one of my friends did, to address yourself
11 to questions that you raise of the applicant. In particular
12 the second question you talk about the need to test
13 containment of cleanup measures. I take it the point you
14 want to stress there, or the point that should be
15 stressed is that the testing must be done in anticipated
16 conditions.

17 A That's true, yes.

18 Q In other words, it's
19 precious little use testing containment measures in the
20 south if they're to be applied in the north.

21 A Yes, that's right, though
22 equally on a very calm day in a Mackenzie Valley location
23 as well.

24 Q Yes. One must approximate
25 as accurately as one can the test environment to the
26 environment that will be used in practice.

27 A I would recommend that,
28 yes.

29 Q Yes. Your last question of
30 the applicant asks how he intends to anchor a boom in

Snow, Pettigrew, Logan
Cross Exam by Goudge

1 the Mackenzie. I take it from your own evidence you feel
2 that's impossible with any efficacy.

3 A I do feel it's impossible,
4 yes.

5 Q Now, you've spoken a good
6 deal about the training of employees in contingency
7 methods. I take it you'd agree that a project such as the
8 construction of a pipeline involves many others besides
9 construction employees in the moving and handling of
10 toxic materials, fuels and the like.

11 A Yes.

12 Q Common carriers, for example,
13 are going to find themselves engaged in far greater
14 quantity in the movement of fuels.

15 A Yes.

16 Q I take it as a result
17 therefore there is going to be an increased need for the
18 assurance of adequate contingency plans for companies
19 like common carriers, in addition to construction companies.

20 A Definitely, yes.

21 Q And would it be your view
22 that it's desirable to enforce or to ensure the development
23 of adequate contingency plans for every company that may
24 be engaged in the increased fuel handling and toxic
25 material handling, that the construction will entail?

26 A Yes, I consider it extremely
27 desirable.

28 Q Mr. Pettigrew, would you
29 see that being the subject of regulation?

30 WITNESS PETTIGREW: Yes, I would.

Snow, Pettigrew, Logan
 Cross-Exam by Goudge

1 Q Now, Dr. Snow, you recite
 2 at the beginning of your paper the objectives that the
 3 particular program that you were involved in sought to
 4 attain. One of the objectives had to do with the study
 5 of changes in the structure of benthic communities in
 6 your selected lakes and rivers and so on. One thing that's
 7 of concern to me is what difference it would have made
 8 to your program if you had used refined oil rather than
 9 the Norman Wells crude that you did? Do you have any
 10 views on that?

11 WITNESS SNOW: Yes, refined
 12 petroleum products such as gasoline and kerosenes ^{naptha} generally
 13 are far more toxic to most forms of aquatic life than
 14 are crude oil, mainly by virtue of the fact that they
 15 have a higher proportion of aromatics. The cresols,
 16 toluenes, so on, than does crude oil. The evidence from
 17 southern spills where diesel or aviation gasoline has
 18 contaminated fairly large sections of creeks or rivers
 19 indicate that even refined petroleum product residues
 20 assist in sediments up to four or five years, and over
 21 this length of time as well there is not very much in
 22 the way of recovery of the normal benthic communities
 23 of those sections of the rivers affected.

24 Q And I take it you use that
 25 kind of evidence to support the proposition that you
 26 spoke about a minute ago, which is that crude oil is
 27 less toxic than the more refined petroleum products.

28 A That's true.

29 Q Dr. Percy told us last
 30 week, or the last time we were here that there is some

Snow, Pettigrew, Logan
Cross-Exam by Goudge

1 measure of debate concerning the relative toxicities
2 of crude oil as opposed to more refined products. I
3 take it you come down on the side of more refined products
4 as being more toxic.

5 A In the spills in freshwater
6 that I've been familiar with I would have to say that
7 refined petrochemicals are more toxic, yes.

8 Q The second objective that
9 your study program sought to achieve, as I understand
10 you, was the outlining of changes that might occur in
11 water quality due to the addition of crude. I take it
12 your reports or some of them deal with that element of
13 your study system.

14 A That's right, yes.

15 Q Could you perhaps provide
16 through Mr. Bayly the specific report that addressed
17 itself to that?

18 A Yes.

19 Q And could you capsuleize
20 the results of that report for us very briefly? What
21 changes did you discover in water quality as a result of
22 the addition of crude?

23 A Yes. Well, basically there
24 weren't any major changes in the major bionic composition
25 of the water. There were some significant changes in
26 the nutrient content of the water, primarily nitrogen,
27 and the major effect was an increase in blue-green
28 filamentous algae.

29 Q That's a kind of eutrophica-
30 tion, I take it.

Snow, Pettigrew, Logan
Cross-Exam by Goudge

1 A That's right, yes, that's
2 the eutrophication response that I was referring to
3 elsewhere.

4 Q Now thirdly, as a study
5 objective you reviewed the fate of crude following your
6 experimental spills. I take it your program dealt with
7 summertime spills.

8 A That's right, yes.

9 Q And I take it you found a
10 very rapid weathering at least of the more refined
11 products.

12 A That's true, yes. We had
13 something like about 50% evaporation in two days.

14 Q Yes. Do you have any views
15 as to whether a spill in open water in the winter would
16 result in the same kind of weathering?

17 A You mean under ice?

18 Q No, in open -- I take it
19 under ice there's no weathering.

20 A Right.

21 Q Yes. Take an open lead in
22 the wintertime, what would you anticipate happening as
23 to weathering, do you get the same weathering? Do you
24 get less-- or more?

25 A I certainly don't think
26 there would be any more, but I wouldn't be surprised if
27 it was the same.

28 Q You've done no tests on
29 it so I take it your professional guess, if I can
30 call it that, would be that the weathering speed would

Snow, Pettigrew, Logan
Cross-Exam by Goudge

1 be roughly the same.

2 A Yes, I would guess that.

3 One of my colleagues has done some work in that area on
4 ponds in Ottawa and finds that there is a similar rate
5 of evaporation from Norman Wells and another type of
6 oil that he used, Swan Hills, I believe in the wintertime.

7 Q Who is that, sir?

8 A That's Dr. Brian Scott.

9 Q Then fourthly you examined
10 in your study program the effect of crude on colonization
11 in river bed substrates by benthic organisms, and as I
12 understand you you found that in your Caribou Bar Creek
13 experiment the benthic organisms all came back in about
14 a year, although cut down by about a third.

15 A No, that's not quite true.
16 They had been cut down by a third within a very short
17 time following the spill.

18 Q Sorry.

19 A Within a year it was not
20 possible to detect any appreciable differences in divers-
21 ity and abundance.

22 Q So that a year later if
23 the benthic organisms were serving as a food source
24 the food supply would be fully replenished.

25 A That's true, yes.

26 Q And you refer by comparison
27 to the temperate latitude experience where in some cases
28 the recovery time for benthic organisms in such cases
29 was four years or up to four years.

30 A That's true. If I could

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1 elaborate on that?

2 Q Well, I'm going to ask you
3 if you wouldn't mind explaining the distinction, why
4 four years in temperate latitudes and one year in the
5 north?

6 A Yes. We believe that
7 it's to do with the river bed type. Caribou Bar Creek
8 was relatively large gravel substrate and owing to the
9 velocity that the river had at the time of the spill;
10 although there was extensive emulsification of the oil,
11 on introduction, right the way through the water column
12 in fact, it did not penetrate the river bed substrate to
13 any extent at all, primarily because the river bed was
14 covered by bacterial or algae slimes from which the
15 emulsified oil tended^{to}/ balance off. Another feature
16 here is that we used two booms as well -- log booms and
17 peat moss booms, and didn't effectively recover any of
18 the oil. In the spills in more temperate latitudes I
19 referred to the smaller molecular size of the more
20 refined petrochemicals penetrated the sandy and silty
21 substrates of the river beds with relative ease and
22 this is what caused the longer-term contamination in those
23 particular spills. Had the situation in Caribou Bar been
24 different, had the particle size been considerably
25 smaller like a sandy substrates rather than the large
26 pebbly gravel, there may have been more penetration
27 and this would have had, in our opinion, a more prolonged
28 effect on the rate of recolonization by zoobenthos.

29 Q So the rate of recolonization
30 is far more affected by the nature of the river bed than

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1 by the latitude.

2 A I can't say that categori-
3 cally because we don't really have an adequate counterpart
4 to the southern spill.

5 Q The southern Caribou^{Bar}Creek.

6 A Right.

7 Q Nonetheless there's no doubt
8 that the nature of the river bottom is one very important
9 factor in determining the rate of recovery.

10 A We consider that to be
11 the case, yes.

12 Q Now, your last objective
13 sought to make recommendations concerning
14 contingency plans, and I take it that the recommendation
15 you give us later on in your prepared evidence effectively
16 capsulized the recommendations that resulted from your
17 study program.

18 A That's true, yes.

19 Q On page 11 of your evidence
20 sir, you deal with clear lakes as one of -- as an oasis
21 for growth in the delta. Does that mean that your view
22 is that the silty lakes can be essentially dismissed as
23 productivity sites?

24 A No, it's just that they
25 are lower down in ranking of productivity of delta
26 lakes based on their suspended sediment composition.
27 Sorry, content.

28 Q Substantially lower down?

29 A In some cases substantially
30 lower down, yes.

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1 Q Is there an easy explana-
2 tion for that?

3 A Yes, it's related to the
4 amount of light penetration that the more turbid lakes
5 in the delta either have a channel connection or they
6 are large and very shallow, and subject to a great
7 deal of wind fetch which keeps the finer suspended
8 sediment particles in suspension. This cuts down greatly
9 on light transparency to a matter of a few centimeters,
10 and obviously thereby cutting down the amount of
11 phytoplankton production in such a lake, and also the
12 rooted macrophytes in the bottom of the lake. These
13 in turn then support the rich and diverse benthic and
14 planktonic communities that characterize the clear lakes
15 of the delta.

16 Q Well, sir, I have an
17 abstract of a paper that you were a co-author of, and
18 I'd like to read you a paragraph from it, if I may, to
19 get your comments on it. The paper is entitled:

20 "The Design for Environmental Impact Studies
21 With Special Reference to Sedimentation of
22 Aquatic Systems in the Mackenzie & Porcupine
23 River Drainages."

24 You're familiar with that paper, I'm sure?

25 A Yes.

26 Q You say in the abstract as
27 follows:

28 "We propose that settled rather than suspended
29 sediment is critical to zoobenthos communities.
30 The amount of sediment that settles depends on

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1 the carrying capacity of the river for sediment
2 and/or the amount of sediment added. The magnitude
3 of the effect will depend on the amount of
4 sediment that settles. The duration of the
5 effect will depend on whether the annual maximum
6 discharge period is capable of removing the added
7 sediment from the substrate and if it is
8 capable, the length of time until the removal
9 occurs. Therefore verification that a river is
10 capable of removing an increased supply of
11 sediment originating from a technological
12 disturbance should be sought. Failing the
13 river's capability to do that, sediment additions
14 should be reduced as much as possible and verifi-
15 cations sought that the annual maximum discharge
16 can remove the added sediment from the river
17 substrate. Addition of sediment to rivers in
18 which annual maximum discharge cannot remove the
19 added sediment should be avoided, or long-term
20 changes in the biota will result."

21 I take it your opinion remains as to that.

22 A That's correct, yes.

23 Q Now, this you propose, as I
24 understand you, a criterion here for the addition of
25 sediment to rivers.

26 A Yes.

27 Q It's a criterion, as I
28 understand you, that is designed to protect the zoobenthos
29 communities of those rivers.

30 A Primarily, yes.

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1 Q Is it a sufficient criterion
2 in your view to also protect fish who may be overwintering
3 or fish who may be spawning in the areas from damage
4 due to settled sediment?

5 A Yes, yes, I think it will.

6 Q So that if we use the
7 criterion of annual maximum discharge being able to
8 remove the added sediment from river substrates, we
9 would have a criterion that satisfactorily protected
10 the fish food supply, that is the zoobenthos community,
11 the fish overwintering situation, and the fish spawning
12 area; is that so?

13 A Yes, that's true. Eggs
14 that have been laid may very well be affected by the
15 settled sediment. Obviously there's nothing we can do
16 about that, but all we're saying there is really that
17 if the carrying capacity of the river is such that in
18 the spring the discharge is sufficient to sweep out all
19 of that settled sediment, then it will obviously free
20 the substrate for subsequent spawning areas for
21 colonization by benthos.

22 Q And there will be subsequent
23 recovery after the one interruption?

24 A Oh yes, provided the
25 substrate doesn't move in.

26 Q Now, could I ask you, sir,
27 how this criterion was developed?

28 A Yes. It stems largely
29 from empirical measurements that were made by the personnel
30 in our project when I was working for fisheries, relating

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1 the discharge of tributaries to the Mackenzie and the
2 Mackenzie itself to the suspended sediment load carried
3 by those rivers at all times of the year.

4 Q And I take it that one
5 could, if one had the time, catalogue each of the rivers
6 in the valley in terms of this criteria?

7 A Yes, there would also be
8 some checking to be done on many of them.

9 Q And what you would be
10 looking for would be rivers whose flow had some excess
11 capacity in terms of the carrying of sediment.

12 A That's right, yes.

13 Q And I took it from one
14 answer you gave earlier today that for example the
15 Great Bear River is a river that is sensitive, and by
16 that I assumed you mean near its capacity in terms of
17 sediment carrying.

18 A Oh no, in fact Great Bear
19 is the reverse of that. The question I believe was,
20 is there any river that I would single out as being
21 specifically sensitive to siltation by virtue of the
22 pipeline crossing site going through an unstable area.

23 Q Oh, I see, I'm sorry, I
24 misunderstood you then. You would think, just to put
25 that example away, that the Great Bear River is a river
26 with a good deal of excess capacity.

27 A Oh yes, the Great Bear is
28 probably one of the clearest flowing rivers in North
29 America, so it's obviously not carrying anything near
30 its capacity.

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1 Q Could you give me an
2 example of a river in the valley that is close to its
3 capacity?

4 A Most of the western
5 drainage tributaries.

6 Q That is those draining from
7 the west?

8 A From the west, yes.

9 Q What about those on the
10 eastern side?

11 A No, for most of the year many
12 of ^{these} are below their maximum carrying capacity. They
13 only have large amounts of suspended sediment during
14 periods of freshet or in the spring, of course, just
15 after breakup.

16 Q So in terms of that criterion
17 alone, a pipeline down the east side of the river is
18 in your view preferable to one down the west side.

19 A That's true. We made that
20 recommendation a little while ago.

21 Q Now, in the next paragraph
22 of this abstract I have you've left me interested, and
23 just let me read you the abstract because I don't have
24 the paper. It says as follows:

25 "The suitability of trying to set an a priori
26 tolerance level for controlling the amount of
27 sediment unnaturally added to systems with
28 natural sediment transport rates, as diversifies
29 those in the Mackenzie and Porcupine drainages
30 is discussed."

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1 Let me ask you whether you found it desirable or undesir-
2 able to try to set such priori tolerance levels?

3 A I think it's desirable.

4 Q Is it practical?

5 A No. That's the problem,
6 it's mainly conceptual.

7 Q Do you feel that it cannot
8 be done at present?

9 A It can be but it would have
10 to be done for each specific crossing site. It's not
11 really very easy to group all of those rivers into a
12 handable number and to classify them as having this, that
13 or the other carrying capacity.

14 Q So tolerance level would
15 have to virtually, in your view, have to be set on a
16 site specific basis.

17 A Yes, it would, because
18 it's dependent not only upon the physical characteristics
19 of the river but also on the biota that live in it.

20 Q Now finally, Dr. Snow, let
21 me ask you a little bit about the consequences of your
22 involvement with not only assessments of the trunk line
23 proposals, so far as you've been doing that, and the
24 gathering line and gas plant proposals, but beyond. I
25 take it your role, as I understood you this morning in
26 the assessment of the gathering lines and gas plants
27 has been at least among other things as an aquatic
28 biologist.

29 A That's true, yes.

30 Q And you've reviewed those

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1 applications, and I take it you've reviewed as well over
2 the last year or two the application for a trunk line
3 down the Mackenzie Valley.

4 A That's true.

5 Q And you formed some general
6 views as to the impacts of both in your area of expertise.

7 A Yes.

8 Q Let me ask you, if you
9 would, to put those impacts together and perhaps add
10 in as best a way as you can attendant development such
11 as the extraction of borrow materials which may be
12 necessary for the trunk line and the gas plants, and give
13 us the benefit of your views as to the cumulative impact
14 of that set of developments on the aquatic systems and
15 fish, particularly of the delta.

16 A Yes. The question of
17 cumulative impact is a very difficult one to come to
18 grips with primarily because of shifting emphasis in
19 developments either within one development or to know
20 exactly how many other types there are going to be in a
21 given area. So I think they can best be illustrated by
22 specific examples of the type of impact which is
23 likely to be cumulative.

24 First of all, oil and fuel
25 spills, there's a finite probability that these will
26 increase with the increasing number of developments,
27 number of transfers, and the actual volumes which are
28 going to be handled; and I would consider this to be
29 most important in the outer delta area because this has
30 the greatest potential for damage. The outer Mackenzie

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1 Delta is essentially -- is essential habitat for freshwater
2 coastal and marine fish that make up the resources of
3 much of the southern Beaufort Sea. The inshore areas are
4 nursery feeding and overwintering areas for both near
5 and offshore fish, and especially the anadromous species
6 which form the basis of the domestic and commercial
7 delta fishery. These are the broad whitefish, char,
8 cisco and conies.

9 In addition to this, the fish
10 tend to concentrate near Kendall Island primarily least
11 cisco and burbot, and also Garry Island ciscos and
12 smelts during the summer. These areas then become even
13 more sensitive in fall when conies aggregate for over-
14 wintering. I specify this particular area as ripe for
15 cumulative impact because it's in the northern area of
16 the delta. Two of the gas plants are located just south
17 of these two islands and both applicants intend to make
18 fairly extensive use of the channels which flow past
19 their development. These channels discharge in the
20 vicinity of both Kendall and Garry Island.

21 The second type of impact which
22 is liable to be cumulative is siltation. This is usually
23 a temporary effect, such as the crossing of a stream
24 by a pipeline. But cumulative impact where acute problems
25 may become chronic could occur if the pipeline and high-
26 way activity were to take place at the same river, more
27 or less the same time.

28 Thirdly, eutrophication type
29 problems, wastes from individual activities going into
30 lakes, channels or rivers may not be a problem when they

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1 are considered separately, but if you have several
2 developments in a discreet area which has a specific
3 drainage then these could form a cumulative problem.
4 The gas plants in the outer delta may again be examples
5 of this particular form of cumulative impact. Some of
6 the wastes from these developments along with any potential
7 fuel spill may also end up in the vicinity of Kendall
8 and Garry Islands, which is especially sensitive for
9 the reasons I gave before.

10 Finally, the obliteration of
11 water bodies by a particular development is also liable
12 to have a cumulative effect. These water bodies are
13 used as sources of either potable water or processed
14 water, or they could be used as disposal areas and
15 again individual developments may put a relatively minor
16 stress on an area in terms of the utilization of such
17 water bodies, but several developments in the same area
18 could exceed some overall damaging threshold and give
19 rise to considerable concern.

20 As many future requirements as
21 is feasible to predict could probably be taken into
22 account in determining this type of aquatic habitat
23 utilization, and we are currently attempting to do this
24 in the delta gas gathering assessment.

25 MR. GOUDGE: Thank you, sir.
26 That setup concludes my questions.

27 THE COMMISSIONER: If you were
28 reading from something, I wonder if it might be marked
29 as an exhibit?

30 MR. GOUDGE: I should explain, sir

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1 that I had indicated to Dr. Snow earlier that I was
2 going to ask him this question.

3 THE COMMISSIONER: Oh yes, we
4 all got that impression. At any rate I thought I was
5 very interested in what you had to say and I couldn't
6 make a note of it and our transcripts are running behind,
7 through no fault of anyone. If you could let Miss
8 Hutchinson have that, even if it's handwritten, and she
9 could photostat a copy for me and mark your copy as an
10 exhibit, that would be helpful.

11 MR. GOUDGE: That concludes my
12 cross-examination, sir.

13 MR. BAYLY: Before this panel
14 departs, there are two view graphs that were shown by
15 Mr. Pettigrew and apparently he has photo copies of
16 those and I would request that those^e be marked as
17 exhibits as well.

18 THE COMMISSIONER: Fine. Yes,
19 thank you. That'd/^{be} very good.

20 (PAMPHLET ON NATIONAL EMERGENCY EQUIPMENT
21 LOCATOR SYSTEM MARKED EXHIBIT 473)

22 (GUIDELINES ON USE & ACCEPTABILITY OF OIL SPILL
23 DISPERSANTS MARKED EXHIBIT 474)

24 (REVIEW OF PETROLEUM SPILL CONTAINMENT DYKES IN
25 THE NORTH MARKED EXHIBIT 475)

26 (PIPELINE SPILL REPORTING NETWORK MARKED EXHIBIT
27 476)

28 (THREAT PREPAREDNESS CHART MARKED EXHIBIT 477)

29 THE COMMISSIONER: Do you have
30 any further questions of the panel?

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1 MR. BAYLY: I have no re-
2 examination, no sir.

3 THE COMMISSIONER: Well, thank
4 you very much, Dr. Snow, Mr. Pettigrew, Mr. Logan. We
5 appreciate very much your attending and we all learned
6 a great deal from you. I think that you've been very
7 patient with us in seeking to instruct us as best you
8 can. We really appreciated it.

9 (WITNESSES ASIDE)

10 THE COMMISSIONER: Now, what
11 happens next? I hope someone will move we adjourn, but --

12 MR. GOUDGE: It's five o'clock.

13 MR. HOLLINGWORTH: Sir, there's
14 one matter. I will unfortunately be leaving in the
15 morning and I won't be able to be here more than -- I
16 won't be here any more than half an hour at the most,
17 and there is one matter I want to address to you. It's
18 a motion of sorts and I wonder if we could take a few
19 minutes for me to dispose of that now?

20 THE COMMISSIONER: Right now?

21 MR. HOLLINGWORTH: Would that
22 be possible? Perhaps the panel would like to depart,
23 I don't know.

24 THE COMMISSIONER: Well, you
25 gentlemen can stay, leave, or if you want to listen to
26 this, I can't imagine your wishing to.

27 MR. HOLLINGWORTH: No, I don't
28 think they would.

29 THE COMMISSIONER: Thank you
30 again.

1 MR. HOLLINGWORTH: Sir, we have
2 known I guess from the outset of this Inquiry and at the
3 Preliminary Hearings that at some time you would be
4 coming to Inuvik to hear evidence, and the schedule for
5 Inuvik, as I understand, was first clarified in November
6 of 1975. Now the schedule has not proceeded as quickly
7 as we had at first anticipated, but nevertheless, we
8 will probably finish the COPE evidence this week.

9 Yesterday at Ingamo Hall you
10 spoke of the need for the Inquiry to proceed on an
11 orderly course, receiving evidence and hearing of
12 testimony, and the rules of the Inquiry in fact provide
13 for this, the production of evidence two weeks prior
14 to its presentation to all participants, and I certainly
15 agree with those principles, as does my client.

16 Naturally this has required
17 some flexibility. We required it ourselves when we
18 were required to present our Phase 1 evidence on
19 relatively short notice, and the spirit of flexibility,
20 although I mentioned to Mr. Bayly about a lack of notice
21 of some of the earlier evidence I made no representations
22 on the record at that time. However, I must protest
23 the latest developments. We would estimate the panel
24 which includes Peter Usher and Nellie Cournoyea will come
25 on Wednesday of this week, or Thursday at the latest.
26 Today at 2 P.M. and 3:15 P.M. we received new evidence
27 by Mr. Usher and Miss Cournoyea respectively. The other
28 participants ^{are} apparently expected to read this evidence,
29 seek such advice as they can, and be prepared to cross-
30 examine these people within a 48-hour period. Surely

1 | this flies in the face of the rules and any reasonable
2 | flexibility.

3 | To compound matters, the evidence
4 | contained some direct attacks on industry in general,
5 | which interests I represent. Moreover, Mr. Usher's
6 | evidence contains enough errors, typos, deletions, and
7 | re-arrangements to render it virtually illegible.

8 | In the past these complaints
9 | have been handled by proceeding and seeing how it goes,
10 | with the proviso that the parties involved will be called
11 | back if advised for cross-examination or further cross-
12 | examination. With respect, sir, this is not good
13 | enough. What seemed a reasonable compromise to one
14 | event is apparently being leaned on as an excuse for
15 | filing evidence up to the last minutes, and all parties
16 | except the applicants and Mr. Bell are doing the leaning.

17 | We then get situations where
18 | evidence goes on the record and stays there unchallenged
19 | unless cross-examination proceeds at some later date
20 | when everyone has forgotten the circumstances in which
21 | the evidence went in, and have only the transcripts to
22 | rely on. It's just not the same.

23 | Furthermore, there is no
24 | guarantee that the press will pick up the item when
25 | cross-examination proceeds and possibly the evidence
26 | is challenged successfully.

27 | Further, it must be remembered
28 | that an important aspect of this Inquiry is the reporting
29 | of a daily event by the C.B.C. reporters. Surely it
30 | asks a lot of these reporters, as well as their listeners,

1 not to mention the lawyers, to go back to an issue
2 which was discussed long ago by this piece-meal cross-
3 examination. My request is that the evidence not be
4 presented until the proper time period has passed and
5 we've had time to consider the evidence. Further, I
6 would suggest that Mr. Usher's evidence be manicured
7 into some readable form; and finally, I would suggest
8 that the evidence properly belongs in Phase 4.

9 I further reserve any objection
10 I ^{may} have as to the relevance of this material.

11 Thank you, sir.

12 THE COMMISSIONER: Mr. Bayly?

13 MR. BAYLY: Well, Mr. Commissioner,
14 Mr. Hollingworth as well as other participants received
15 a summary of this evidence more than two weeks ago. Now
16 the requirements of your ruling, sir, are that a summary
17 be provided. I have also provided today the text of that
18 evidence. I submit, sir, that I have complied with the
19 rulings with regard to this particular panel. But in
20 order to make it easier for my learned friend, I have
21 provided Dr. Usher's evidence in the form in which he
22 gave it to me, so that he would have advance notice of
23 the text of it, and albeit with corrections, it's
24 presently being typed in its final form and that will
25 be given to Mr. Hollingworth as well as the other
26 counsel, as soon as it's available.

27 Now I submit, sir, that if
28 there was any protest about the summary, that that could
29 have been raised at an earlier time.

30 THE COMMISSIONER: Well, the
summary, I take it, was satisfactory, apart from matters

1 of relevance which may or may not be raised. But the
2 suggestion Mr. Hollingworth has made is that the summary
3 doesn't fairly reflect what he now finds is to be the
4 burden of Mr. -- of Dr. Usher's evidence.

5 MR. BAYLY: I didn't understand
6 him to say that, sir, though if that's what his point
7 is --

8 MR. HOLLINGWORTH: I don't
9 recall receiving any such summary two weeks ago, sir.
10 I stand to be corrected by my friend, but I have here
11 an item called:

12 "Banks Island Petroleum Exploration,"
13 by Peter J. Usher, which was presented February 9, 1976,
14 to the Inquiry or to the participants, and I have another
15 document by Peter J. Usher entitled,

16 "Producers' Proposal and MDDGAG ,"
17 which was presented on February 14 at 4 P.M. in the
18 afternoon. I don't recall any outline of evidence by
19 either Mr. Usher or Dr. Usher and Miss Cournoyea.

20 MR. BAYLY: Well, Mr. Commissioner,
21 that was handed out and filed, and I don't have that
22 before me; but prior to the last break and it is that
23 that I'm referring to. If Mr. Hollingworth hasn't got
24 a copy, it may be because I gave it to the other Foothills
25 counsel who was here at that time.

26 MR. HOLLINGWORTH: Well, sir,
27 my only answer to that is that it's all handed in to a
28 central person who sees that it's distributed to the
29 proper parties involved, and I can't imagine such an
30 error being made.

1 THE COMMISSIONER: Well, that's
2 the procedure laid down in the rulings, at least I
3 think it is; but the thing, they have been distributed
4 up here rather than mail them to someone in Ottawa --
5 or in Yellowknife to be mailed back here.

6 MR. GOUDGE: I'm sure
7 the summary was distributed to everyone who was here,
8 sir. I don't know that it was mailed to those who
9 weren't here.

10 THE COMMISSIONER: Well, the
11 -- have you read the summary and the --

12 MR. GOUDGE: I've read
13 the summary, sir. I've not read the evidence that was
14 delivered so I can't unfortunately assist you, sir,
15 as to my views concerning any correspondence or lack
16 thereof between the evidence as delivered and the
17 summary.

18 THE COMMISSIONER: Well, I
19 think what we'll do is this.

20 MR. MARSHALL: Mr. Commissioner,
21 perhaps if I might speak on this.

22 THE COMMISSIONER: Sorry.

23 MR. MARSHALL: Before a
24 decision is made, I have a synopsis, it's two pages and
25 five lines, and the written material that I have to
26 this point, which I take it is the text of what the
27 witnesses intend to say, would, I guess, run to 70
28 pages or something of that sort. I don't have all of
29 it in front of me. It's pretty difficult for anyone to
30 adequately summarize that much detail in two pages and

1 five lines, and I think that --

2 THE COMMISSIONER: Is that the
3 Usher one?

4 MR. MARSHALL: Well, this
5 summation, sir, the two pages and five lines, relates
6 to the evidence of the entire panel, and in that --

7 THE COMMISSIONER: What is
8 the 70 pages?

9 MR. MARSHALL: -- that includes
10 Mr. Usher -- Dr. Usher's three pieces of evidence,
11 Gaile Noble's evidence, and Nellie Cournoyea's evidence,
12 and Lorraine Allison's evidence. I guess it's something of that
13 order, I may be high or low, but there's quite a bulk
14 of material and I sympathize with Mr. Hollingworth because
15 a summary or synopsis that's that brief simply can't
16 deal with it in any way that enables you to get advice
17 from one's advisors.

18 My difficulty with the evidence --
19 and I haven't yet read all of it, I'm struggling through
20 it -- my difficulty is that I'm not really sure that
21 it's going to help at this stage, the work of the
22 Inquiry. It seems to me that what I have read is to a
23 large extent argumentative in the sense that it is a
24 critique of the track record of government and industry
25 relating to informational programs that were conducted
26 or were failed to be conducted in the past before Berger,
27 if you like. It deals with the mistakes of the past, if
28 you like, and makes suggestions that this oughtn't to
29 have happened. In large part I think it's really
30 argumentative in that it's castigating government for

1 not having done things and that sort of thing.

2 It's not in a sense evidence
3 so much as it is argument or a submission that one would
4 make, having assessed the evidence that's been produced,
5 or the cross-examination of panels of witnesses. I
6 can be a little more specific, if you wish to get into
7 that, sir. With respect to the evidence that I've
8 reviewed, I made some notes as to the particular
9 aspects of it and those passages which I think really
10 go off in that direction.

11 MR. BAYLY: Well, Mr. Commissioner,
12 I'm prepared to argue that it's irrelevant at some
13 point. I understand right now I'm facing a motion by
14 Mr. Hollingworth as to whether he's had enough time, and
15 am I also now facing a motion from Mr. Marshall as to
16 whether or not this is evidence that should be heard?

17 MR. MARSHALL: Well, I'm prepared
18 to wait and deal with this question of relevancy later.
19 The issue that Mr. Hollingworth has raised is even more
20 fundamental.

21 THE COMMISSIONER: I think both
22 issues are important but it may be they merge in a
23 sense.

24 MR. GOUDGE: May I say one
25 short thing, sir, before the matter passes on? I don't
26 propose to get into the matter of relevance until Mr.
27 Marshall raises that in some more direct sense. As to
28 the matter that Mr. Hollingworth raised, the intent, as
29 I understood it, sir, of the preliminary ruling that you
30 made concerning summaries was to provide all the

4 THE COMMISSIONER: Precisely.

Whatever else may happen in the public domain beyond the boundaries of this Inquiry is, in my respectful submission, perhaps the concern of Mr. Hollingworth's client but not the concern of you, sir, and I would think that the practice we've adopted to date is a practice which serves the needs of the Inquiry. It's in my opinion a sensible practice where we have evidence that's delivered late or where certain circumstances other than late delivery result in difficulties of immediate cross-examination, cross-examination is deferred. The principle, though, that I think we should keep in mind is that there be at some stage the opportunity of full and considered cross-examination and provided that is met, that is what the Inquiry should be

1 concerned with. It seems to me, sir, that in that
2 light if evidence is delivered late, the penalty suffered
3 by the deliverer is that he must produce his witnesses
4 later on for full and considered cross-examination and
5 that if that is done, the needs of the Inquiry are met.

6 MR. MARSHALL: ^{If} I might speak to
7 that, sir.

8 THE COMMISSIONER: I'm against
9 Mr. Goudge on that, if that helps.

10 MR. HOLLINGWORTH: Are you against
11 him on
12 /both points he raised, sir?

12 THE COMMISSIONER: Maybe I'm
13 against him on the other point, the only one I remember
14 is the second point.

15 MR. GOUDGE: I only made one.

16 MR. HOLLINGWORTH: Well, it
17 seems to me that there was the point about whether
18 the needs were being served by the present practice,
19 and also the argument that what went on outside the
20 four walls of the Inquiry room should be of no concern
21 to you.

22 THE COMMISSIONER: Yes, well
23 I'm against him on the second point. The first -- well,
24 I don't know what the first point was.

25 MR. GOUDGE: I only made one
26 point, sir.

27 MR. MARSHALL: If it helps you,
28 I'm against it.

29 THE COMMISSIONER: Look, I think
30 what we ought to do is this. It certainly sounds, Mr.

1 Bayly, as if this summary was not adequate, and I'm not
2 saying it was or it wasn't, I'd have to read it, then
3 read the evidence to decide that, which I'm not --

4 MR. HOLLINGWORTH: Excuse me,
5 sir, there are 111 pages, I calculated there are 111
6 pages of evidence for this panel.

7 THE COMMISSIONER: Well, it
8 sounds as if the summary wasn't adequate, and I know
9 the conditions under which you are working and everybody
10 else, and it's not easy. But I think that the other
11 point Mr. Marshall raised relating to relevance concerns
12 me too, and I have some idea of what this evidence is
13 all about because ^{I think} Mr. Scott and Mr. Goudge have both
14 informally raised it with me and indicated that it may
15 present problems of relevance, and it certainly sounds
16 as if it harkens back to the kind of dispute I got
17 into with you during the course of Mr. Yates' evidence.

18 MR. BAYLY: I've purposely done
19 my very best to keep it out of that area, and to present
20 what I consider to be three histories with some recommen-
21 dations for the future.

22 THE COMMISSIONER: Excuse me,
23 Mr. Bayly. I'm not going to rule on anything right this
24 minute, so don't -- I just want to get out of here.

25 (LAUGHTER)

26 MR. BAYLY: So does Mr. Holling-
27 worth.

28 THE COMMISSIONER: Did you say
29 you're leaving tomorrow, Mr. Hollingworth? You'll be
30 here tonight.

1 MR. HOLLINGWORTH: Yes.

2 THE COMMISSIONER: Well, I would
3 like you to do this. If Mr. Goudge would meet with
4 counsel this evening, bearing in mind what I have said
5 first of all that doesn't appear to be an adequate
6 summary, secondly that I really don't want to thrash
7 old chaff, I'm not saying this is what's in that
8 evidence but I am not interested in spending the time
9 of this Inquiry investigating how the government went
10 about making decisions in the past, here in the delta.
11 They haven't asked me to do that, and I don't intend
12 to do it.

13 The third thing is that I agree
14 entirely with Mr. Hollingworth, if you present a witness
15 and he theoretically makes an attack of some consequence
16 say on the industry, which Mr. Hollingworth says is
17 done in Dr. Usher's evidence. We know that the C.B.C.
18 is broadcasting each evening an account of what occurs
19 at the Inquiry and I think that in the nature of
20 things the cross-examination, if it occurs months
21 afterward, may very well not be reported in a way that
22 makes it plain to the listeners what the point of the
23 thing is, and though we in the Inquiry may very well
24 be able to comprehend it, others may not and what people
25 outside the Inquiry think, what their perceptions are
26 are important because this is a public Inquiry. We're
27 doing it in public not just so that ^I can understand
28 what is being said, but so that the public can understand.
29 So I don't think it is fair to present Dr. Usher if indeed
30 this is what is likely to occur, when the industry isn't

1 prepared to cross-examine him and when it may appear
2 to the public that the attack of considerable magnitude
3 has been successfully made on the industry without any
4 answer, without any resistance at all. So those are a
5 few things that really do concern me.

6 We've gotten along, and all of
7 you have co-operated magnificently. We've gotten along
8 by being reasonable and rational and co-operating. I
9 would like you to meet with Mr. Goudge and go over this
10 thing, and if you can't agree on a procedure, then let
11 me know tonight and I'll do one of two things: I'll
12 take the summary and the evidence, read it tonight, and
13 rule first thing in the morning; or else I'll meet an
14 hour early in the morning before you get the plane and
15 hear any further submissions you want to make.

16 MR. BAYLY: Mr. Commissioner,
17 that somewhat. If, as far as I'm concerned, if one of
18 the counsel says that it doesn't give them a chance to
19 prepare cross-examination and because these are people
20 who are all people who work either regularly or on a
21 contract basis for my client, I'm quite prepared to
22 bring them either later in this phase or at another
23 point in the Inquiry to enable Mr. Hollingworth, Mr.
24 Marshall and others to properly cross-examine, to
25 properly prepare for their cross-examination.

26 THE COMMISSIONER: All right.
27 Well, I hope you gentlemen don't mind giving up an
28 hour of your time this evening to meet with Mr. Goudge
29 and try to sort this out amicably. I just want you to
30 know the trend of my thinking and that may be helpful to

1 you. Well, all right, we'll adjourn till 9:30.

2 (PROCEEDINGS ADJOURNED TO FEBRUARY 17, 1976)

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Berger Hearings

16 Feb., '76.

Mackenzie Valley Pipeline -
Inquiry

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MACKENZIE VALLEY PIPELINE INQUIRY

Government
Publication

IN THE MATTER OF APPLICATIONS BY EACH OF

(a) CANADIAN ARCTIC GAS PIPELINE LIMITED FOR A
RIGHT-OF-WAY THAT MIGHT BE GRANTED ACROSS
CROWN LANDS WITHIN THE YUKON TERRITORY AND
THE NORTHWEST TERRITORIES; AND

(b) FOOTHILLS PIPE LINES LTD. FOR A RIGHT-OF-WAY
THAT MIGHT BE GRANTED ACROSS CROWN LANDS
WITHIN THE NORTHWEST TERRITORIES,
FOR THE PURPOSE OF A PROPOSED MACKENZIE VALLEY PIPELINE

and

IN THE MATTER OF THE SOCIAL, ENVIRONMENTAL AND
ECONOMIC IMPACT REGIONALLY OF THE CONSTRUCTION,
OPERATION AND SUBSEQUENT ABANDONMENT OF THE ABOVE
PROPOSED PIPELINE

(Before the Honourable Mr. Justice Berger, Commissioner)

Inuvik, N.W.T.

February 17, 1976

PROCEEDINGS AT INQUIRY

Volume 127

APPEARANCES:

Mr. Ian G. Scott, Q.C.,
Mr. Stephen T. Goudge,
Mr. Alick Ryder and
Mr. Ian Roland for Mackenzie Valley Pipeline
Inquiry;

Mr. Pierre Genest, Q.C.,
Mr. Jack Marshall, and
Mr. Darryl Carter for Canadian Arctic Gas
Pipeline Limited;
Mr. Reginald Gibbs, Q.C.,
Mr. Alan Hollingworth &
Mr. John W. Lutes, for Foothills Pipe Lines Ltd.;

Mr. Russell Anthony &
Pro. Alastair Lucas for Canadian Arctic Resources
Mr. Garth Evans Committee;

Mr. Glen W. Bell and
Mr. Gerry Sutton, for Northwest Territories
Indian Brotherhood, and
Metis Association of the
Northwest Territories;

Mr. John Bayly
or
Miss Leslie Lane for Inuit Tapirisat of Canada,
and The Committee for
Original Peoples Entitle-
ment;

Mr. Ron Veale and
Mr. Allen Lueck for The Council for the Yukon
Indians;

Mr. Carson H. Templeton, for Environment Protection
Board;

Mr. David Reesor for Northwest Territories
Association of Municipal-
ities;

Mr. Murray Sigler for Northwest Territories
Chamber of Commerce.

Mr. John Ballem, Q.C., for Producer Companys;

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- In Chief

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- Cross-Examination by M r. Evans

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- Cross-Examination by Mr. Gibbs

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- Cross-Examination by Mr. Goudge

19374

Hugh MONAGHAN

- In Chief

19388

- Cross-Examination by Mr. Evans

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- Cross-Examination by Mr. Gibbs

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- Cross-Examination by Mr. Goudge

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Hugh TRUDEAU

- In Chief

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EXHIBITS:

481 Qualifications & Evidence of H. Monaghan

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482 Qualifications & Evidence of H. Trudeau

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1 Inuvik, N.W.T.

2 February 17, 1976

3 (PROCEEDINGS RESUMED AT 9:30 A.M.)

4 MR. GOUDGE: Sir, I think we're
5 prepared to begin. Despite counsels' squabbling
6 behavior^{of} yesterday, sir, we met at the end of the day
7 in response to the invitation you offered and in light
8 of Mr. Hollingworth's motion and were able, fortunately,
9 to work out a compromise in connection with the panel
10 of witnesses headed by Dr. Usher. The compromise is
11 that Mr. Bayly has agreed to defer the presentation of
12 that evidence until Phase Four and he will be indicating
13 to other counsel in due course when he proposes to pre-
14 sent that evidence in Phase Four and the form it will
15 take. Any future objections concerning that evidence ca
16 obviously be raised at that time. In light of that, I've
17 spoken to both Mr. Hollingworth and Mr. Gibbs, and they
18 are prepared to withdraw their motion and therefore no
19 ruling is required by you, sir. So, I think in that
20 event, we can proceed with Mr. Bayly's next panel.

21 MR. BAYLY: Mr. Commissioner,
22 there's only one matter arising out of that. I'd
23 understood our agreement that I would defer it until
24 later. I don't think I was as specific as to agree
25 that it would necessarily belong in Phase Four.

26 MR. GOUDGE: That's correct, sir.

27 MR. BAYLY: Before we begin with
28 Mr. Longlitz, sir, I have a copy of Dr. Pimlott's book
29 "Oil Under the Ice", which I will table as an exhibit
30 as it was referred to in his evidence.

D. Longlitz
In Chief

1 Oil Spill -- Cumulative Impact, by Dr. Snow,
2 marked as Exhibit #478.

3 "Oil Under the Ice", Pimlott, Brown & Sam,
4 marked as Exhibit #479.

5 MR. BAYLY: Sir, the next
6 witness for the Committee for Original People's
7 Entitlement is Dale Longlitz and he has already appear-
8 ed before the Inquiry, appearing for the Commission.

9 THE COMMISSIONER: Yes, I
10 know. I know Mr. Longlitz well.

11 MR. BAYLY: So it probably,
12 unless you wish it sir, won't be necessary to go
13 through his qualifications.

14 DALE LONGLITZ, resumed
15 DIRECT EXAMINATION BY MR. BAYLY:

16 Q Mr. Longlitz, I wonder
17 if you could begin your presentation?

18 WITNESS LONGLITZ: Well, I've
19 been asked to present --

20 THE COMMISSIONER: Excuse me,
21 if there's something in writing, maybe I could have a
22 copy?

23 MR. BAYLY: The presentation,
24 sir, will largely be accompanied by a number of slides
25 and a commentary by Mr. Longlitz, rather like the Dr.
26 Bliss presentation.

27 THE COMMISSIONER: I see,
28 good.

29 A I've been asked to pre-
30 sent a picture of the exploration activity and trends

D. Longlitz
In Chief

1 as I perceive it from my experience and I'll limit
2 the area that I'm covering in just more or less the
3 delta proper, and I'll show a map a little later on
4 which will explain that area and then I'll go on to
5 display it on a larger scale to give us a better pic-
6 ture.

7 The exploration activity is
8 broken down into two basic categories. We have ex-
9 ploration activity prior to '71 and exploration
10 activity after '71. The activity prior to 1971 was
11 administered in two different methods, which is prior
12 1969, a Notice of Commencement letter was submitted to the
13 oil and gas division. Seismic exploration of the delta
14 commenced in the early 60's, and a number of programs occur-
15 ed prior to the period covered by the map which I'm
16 doing to show you.

17 During this time, the concerns
18 for the environment were not as great as they are
19 today, and with the emphasis towards the environment
20 and the increase in the activity of the procedure for
21 administering the program was changed to a letter of
22 intent and agreement in principle in 1969. A letter
23 of intent and preliminary plan was submitted to the
24 Department of Indian and Northern Affairs and this
25 letter set out in general terms, a description of
26 the proposed operation and included approximate dates
27 of commencement, completion, a description of types
28 and approximate numbers of transport, fuel storage camps
29 and other support equipment, the approximate location
30 of access routes, staging areas and such information

1986
D. Longlitz
In Chief

1 that is available which would permit the director in
2 Ottawa to make a preliminary appraisal of the proposed
3 operation on the affected land surface and the
4 adjacent ecosystems.

5 MR. BAYLY: Mr. Longlitz,

6 could you go a little slower because the Court Reporter
7 is having a hard time keeping up with you.

8 A This letter was to be
9 accompanied by a preliminary plan showing the approxi-
10 mate location of the activity including staging areas,
11 airstrips, access routes and such other features and
12 facilities associated with the operation and the use,
13 installation or construction of which may have a
14 significant effect on the land surface and adjacent
15 ecosystems.

16 Following receipt of this
17 letter and map, the director, after consideration and
18 approval, would forward an agreement in principle
19 outlining a schedule of operating conditions to the
20 operator for his agreement. This agreement was then
21 to be signed by the operator as agreed to and returned
22 to the director before commencement of the activity.
23 The enforcement of the conditions was carried out by
24 the Mackenzie Forest Service which is now called the
25 Northwest Lands and Forest Service. Unfortunately, I
26 am unable to present pictorially the trend in
27 exploration activity before 1971, as I was not involved
28 with the programs prior to that date.

29 However, I did find that there
30 were some 15 wells drilled between 1969 and 1971 in

D. Longlitz
In Chief

1 this area. There was five seismic programs conducted
2 by the letter of intent and agreement and nine wells
3 were drilled. These wells were located one in the
4 vicinity of Aklavik, four in the vicinity of the Taglu
5 area and four in the vicinity of the Tuktoyaktuk.

6 In 1971, with the implementa-
7 tion of the Territorial Land Use Regulations, the permit
8 system and enforcement procedure already described in
9 my previous testimony came into existence.

10 In order to display this
11 activity in trends, I propose to utilize the mapping
12 series of 1:250,000 and when I use this series, I
13 think there are some considerations which must be
14 kept in mind. At this scale, one inch equals approxima-
15 tely four miles and to better explain the significance
16 of each line, if I drew a line to scale on that map,
17 it would be barely visible. For example, a wellsite
18 in actual scale would be represented as a fine dot,
19 whereas, on these maps, it is a small circle. The
20 activity displayed here has been plotted by a drafting
21 office somewhat removed from the field and therefore,
22 there may be some discrepancies in the plottings as
23 to accuracy and in a very few cases, lack of plottings.

24 However, I believe, they are
25 a very close picture of what was carried out in the
26 area. You will note they are marked "Preliminary
27 Draft Maps" which are being upgraded.

28 Just prior to presenting the
29 slide information, I wish to explain the system that
30 I utilized as it is a key in understanding the present

D. Longlitz
In Chief

1 ation.

2 As programs were submitted
3 in an application for permit stage, they were plotted
4 on an operational series of maps. When these programs
5 were completed and the files closed, the program was
6 taken off the operational series and placed on a yearly
7 series. The year used was a fiscal year commencing
8 June 1st of one year and carrying through to May 31st
9 of the succeeding year. The reason being that the
10 land use activity follows that trend.

11 Therefore, the yearly series
12 of maps are labelled 1971-72 and 72-73 and so on.
13 The operational series which consists of programs in
14 the application stage, recently completed stage, or
15 file not finalized, utilized two maps of the same area,
16 one outlining seismic activity and the other outlining
17 the remainder of the land use activity. This was
18 done as the initial stage. In the initial stage the
19 activity was very intense and one could not properly
20 portray all the land use activity on a single map.
21 Again, this is mainly due to the scale.

22 I will present these maps by
23 firstly, outlining a base map and then presenting a
24 picture of the yearly land use activity as recorded.
25 I will then present the following year's land use
26 activity and then show an amalgamated picture of the
27 yearly programs.

28 I will proceed along this
29 manner by finally giving the complete picture of all
30 activity to date, including the operational series.

D. Longlitz
In Chief

1 If you could just get the
2 lights, please. This map here is enlarged one to four
3 million map and the blocked out area is the area that
4 I will talk basically -- concern myself with. It
5 starts a little below Inuvik and goes up and takes in
6 Tuktoyaktuk and then goes to the -- it extends into
7 the Yukon but I will stay with the Northwest Territories
8 but that's basically the block, it goes below Aklavik
9 and across right through into the Richardson Mountains
10 and then go up to the border and then back onto the
11 Beaufort Sea.

12 This first map is the lower
13 delta area and I could maybe point out some features.
14 You have the Kugmallit Bay area with the Mackenzie
15 Bay area, we come down over here we have a Tununuk,
16 Swimming Point, you come up here with the Eskimo
17 Lakes and Tuktoyaktuk is there. Of course, this is
18 Garry Island and Pelly Island up above it here.

19 This first slide represents
20 the 1971-72 activity. There, of course, was more
21 activity than displayed here, but this was completed
22 under the previous administration already mentioned
23 and you will note that there is some offshore seismic
24 shown, this part up in here.

25 As the Land Use Regulations
26 pertained to the land portion, all the offshore
27 activity is not displayed here, only the portion
28 associated with the land use activity. In this year,
29 some 738 miles were shot on land and 468 miles were
30 offshore, according to my calculations.

D. Longlitz
In Chief

1 You will also note that there's
2 the Yaya Lake granular activity as represented right
3 there. The numbers on the lines, these are numbers
4 down these lines here which are quite readable from
5 this distance -- correspond to the permit system as a
6 means^{of} identification. The trend here seems to be to
7 a basically a reconnaissance type of seismic activity
8 with long, straight lines.

9 MR. GIBBS: Could I interrupt
10 at this moment to ask whether this seismic was
11 actually done or were these just permits to do
12 seismic work?

13 A These lines were actually
14 done. They were plotted from the final plans received
15 from the companies. The lines -- I'll
16 go back -- the reconnaissance type of seismic do long
17 straight lines in an attempt to determine the gross
18 subsurface structuring. I should also point out that
19 this area is mainly above the treeline and on the
20 tundra.

21 In this year -- and one
22 thing I should explain, that the wells -- you won't
23 see the wells plotted as they were drilled on these
24 maps because it's according to our system of plotting
25 and we plot them only when the file is finalized and
26 therefore, the well may have been drilled in the area
27 but not plotted on these maps and they'll come on
28 later on in the series and will be presented on the
29 operations series, if they are not finalized.

30 This is the 1972-73 activity.

D. Longlitz
In Chief

1 Here, we see a further concentration of activity off-
2 shore in the Beaufort Sea area. During this period,
3 I show 806 miles of seismic onland and 966 offshore.

4 THE COMMISSIONER: What period
5 is it in?

6 A '72-73.

7 Q And this is just for
8 that year, this isn't superimposed?

9 A No, this isn't super-
10 imposed, this is just for the year.

11 Q What are the figures
12 again?

13 A I show 806 miles of
14 seismic onland and 966 miles offshore. Again, you
15 will note what I suggest is reconnaissance type seismic
16 with a lot of the long straight lines. There is,
17 of course, some detailed seismic into
18 closer lines, and where the interesting structures
19 were found from previous reconnaissance seismic, this
20 would only be known by the company completing the
21 seismic. There is drilling activity plotted on this
22 map near the Tuk and the Big Lake area. The Big Lake
23 area is right in this area. That's a wellsite location
24 plotted there and you'll see two more over here. They
25 were drilled in prior years.

26 THE COMMISSIONER: Where is
27 the seismic obscured, the boundary of the Mackenzie Bay
28 there, the boundary which would land --

29 A It roughly comes in
30 about in this area here, right up across the top right

D. Longlitz
In Chief

1 through there, you know, and up around and down, the
2 the two islands in here. Now, in this time, there were
3 some 19 wells drilled as well in this area and the
4 general area they were drilled is right up, you
5 could come up here and across and just catching that
6 area and coming right down in here, this was the basic
7 concentration with some 19 wells drilled in this area.

8 MR. BAYLY: Could you indicate,
9 Mr. Longlitz in words where you're describing so that
10 it will appear on the record, just the general area
11 that you've outlined that the wells are.

12 A Well, it'd be south of
13 Big Lake and angling I guess you'd say to the lefthand
14 corner of the 107-C map sheet. See that pattern there.
15 This is an amalgamated picture of 71-73 now, it gives
16 you the more concentrated picture. The two basic
17 concentrations -- concentrated areas of seismic, this
18 one here, and then the one offshore.

19 THE COMMISSIONER: When you
20 said "this one here", that's northwest of Parsons Lake.

21 A Northwest of Parsons Lake
22 above Tununuk which is down here, bar C and Swimming
23 Point which is up in here so -- and the Yaya
24 Lakes, right in here. Just north of the Yaya Lakes
25 actually. We show some wellsites from the previous record.

26 This is the 1973-74 activity.
27 You will note here a shift to a more detailed type
28 of activity in concentrated patterns, both offshore and
29 onshore activity. You see, there; a certain amount
30 there and right there especially.

D. Longlitz
In Chief

1 MR. BAVLY: When you say "there"
2 in the first instance, Mr. Longlitz, you're pointing
3 to the Garry Island area?

4 A Yes, Garry Island is up
5 right here, just south of Garry Island and then just
6 above Garry Island and then on the Richards Island
7 proper to the north up by Pullen.

8 During this year, I indicate
9 some 936 miles onland and 312 miles offshore were shot.

10 MR. GIBBS: How much offshore?

11 A I show 312. Again, this
12 is -- being you asked that, I should again point out
13 that the offshore may not be all the seismic that was
14 shot, this is only associated with the land based opera-
15 tions. If you had a completely offshore operation we
16 would not have information on that.

17 MR. GIBBS: Is the 934
18 miles all shown on that map?

19 A Yes. In this year, there
20 were 11 wells drilled in this program. I should point --
21 I point out that these permits again, are issued for a
22 period of two years with an extension of one more year
23 and some of the activity may not be represented here as
24 it's still on the year's operational maps which will be
25 presented later on. An example here is the Yaya Lakes
26 activity and the number of drilling wells in this year.
27 As I say the activity is presented -- we don't put it
28 on as it was done, it carries on through to the opera-
29 tional series and in the end, it will all come out, but
30 there may be some activity which is not plotted. Mainly

D. Longlitz
In Chief

1 the seismic is plotted on here, the drilling tends to
2 go over that and the Vaya Lakes for the operation.

3 This is your amalgamated pic-
4 ture. The question comes up in mind here, is why are
5 there so many lines in close proximity to one another
6 and especially in a reconnaissance type of seismic.
7 This develops for a number of reasons, some of which
8 are permit areas assigned to specific companies refer
9 only to drilling and any company can do seismic in any
10 other area. It is a competitive industry. Poor records
11 may have been obtained on the initial run. The
12 interpretation of data may vary from company to company
13 as it is dependent on the geologist with the specific
14 company who interpret the seismic data. Some of these
15 programs were shot on speculation by companies who are
16 in the business of selling seismic information.

17 Lines may be run over a pre-
18 viously drilled wellsite in order to compare the seismic
19 data with a known well bore data. So, there are a
20 number of reasons why the seismic was conducted.

21 MR. PAVLY: Mr. Longlitz, you
22 referred to that as a composite, I wonder if you could
23 tell us what years it's a composite of?

24 A Oh. Yes, that's a compo-
25 site of 1971 to 1974.

26 And then in the '74-75 series
27 and again some of the seismic here will be on the
28 operational series which will come up very shortly, but
29 in this year some of the program is represented as an
30 offshore program, up here, plus an artificial island

1 which you see here.

2 Q And when you say "up here",
3 you're pointing to the northwest corner of the map.

4 A Yes.

5 THE COMMISSIONER: What is this
6 again, Mr. Lorolitz?

7 A That's offshore seismic.
8 This is the 74-75 which is our year -- which is a yearly
9 series of what has been finalized and put on the map,
10 one artificial island in this area here

11 Q This is '74-75 so this
12 is ending last spring?

13 A Yes.

14 Q And that was all that
15 occurred last year?

16 A Yes. There is, as I
17 mentioned, some seismic here coming
18 up in the next year which you'll see on this here.
19 Basically there was some more -- there was more activity,
20 but it hasn't been cleared up. When you go to the next
21 series, you should be able to see what would come on this
22 series.

23 MR. GOUDGE: Do they have the
24 mileage figures for that?--

25 A Yes, I show 36 miles here
26 offshore.

27 Q And none onshore?

28 MR. GIBBS: And none onshore?

29 A Yes. That will come in on
30 the operation series just next to it: This is '75-75

D. Longlitz
In Chief

1 series where you see considerable offshore activity and
2 you will note the offshore seismic activity and the smear
3 in the center of your -- is not a poorly conducted
4 seismic line, it's just a smear on the negative that
5 came out here. There's a well and an access road down
6 here as well.

7 MR. BAYLY: When you say "down
8 here" that's just to the northwest of the Fskimo Lakes.

9 MR. GOUDGE: I'm sorry, Mr.
10 Longlitz do you have that -- the March figures for that
11 last slide so we can keep it to date?

12 A I didn't write it down.
13 No, I'm sorry. I have in the 1971-76 program is that this is
14 an aggregate map and the trend of the activity as you can
15 see was basically to the offshore area--was still this
16 pattern down here and you have quite a considerable
17 amount of activity taking place offshore. The Yaya
18 Lakes activity is very strong right here.

19 This is the -- now this is the
20 one, the operational series map which have the programs
21 plotted which are not on the yearly series because they
22 haven't been cleared off yet. Now there'll be some '74
23 programs on there and you can see some of the -- what
24 this points out here is, again, the concentrated patterns.

25 THE COMMISSIONER: Now what is
26 this?

27 A This is the operational
28 series. This is the outstanding stuff.

29 Q That they are currently
30 doing?

D. Longlitz
In Chief

1 A Well, this here dotted
2 line pattern here, you can see, that's a proposed program,
3 the dotted line pattern. The solid line stuff has been
4 completed probably within the previous year and the
5 previous two years -- '74-75 and '75-76, but this is
6 all proposed down here, you see and in through here.

7 MR. GOUDGE: I take it that is
8 the sum total of what's been done and proposed and not
9 yet finalized?

10 A That's right, yes.

11 MR. BAYLY: Perhaps in that
12 regard, Mr. Longlitz, you could explain the term you
13 used "clearing off".

14 A Well, it's when -- it's
15 after we have received the final plans from the company
16 and we've done final inspections on the programs and are
17 satisfied that there's -- you know, that we can close
18 that particular file.

19 MR. GIBBS: What's the final
20 inspection, is that after the program's completed?

21 A Yes. There's no final
22 done when the program is ongoing, it's only done after,
23 then you see the various areas.

24 MR. GOUDGE: Sorry, Mr. Longlitz,
25 do you have any idea of the mileages on the operational
26 map?

27 A Yes. On that operational
28 stage, 936 miles onland and 586 miles offshore. This
29 is the amalgamated series of the entire activity to date
30 with the operational series superimposed over top. This,

D. Longlitz
In Chief

1 again pertains -- I haven't shown the drilling part of
2 it yet which we'll come to shortly. My records indicate
3 that a total 3,416 miles were shot onland, 2,368 miles
4 were shot offshore. That's after 1971.

5 MR. GIBBS: Could I ask again
6 the dimensions of that map. How many miles is it across
7 the bottom and how much vertically?

8 A It's four miles to the
9 inch, now.

10 MR. GOUDGE: That's about eight
11 feet across there.

12 A I'd have to do a little
13 calculation here.

14 Q Would it be sixty miles north
15 south approximately?

16 A I don't know, I'd have to
17 get my pencil out and work it out. We have here now,
18 the drilling activity and other operational activity not
19 including the seismic and this is still active as our
20 operational series and I might point out some features
21 here. You have here the majority of drilling activity
22 quarrying and geotechnical investigation. These
23 particular things, these areas here represent geotechnical
24 investigations and soil sample programs in here, down
25 through here and you have, also note, the islands up
26 here. There's a series of the Adgo islands, the Netserk
27 island which is this one up here, the Immerk, which you're
28 probably familiar with, up here, pardon me; and, the
29 Pullen Island, Unark and Pelly Island. Those are the
30 series of islands.

19. 1-1-1977
In Chief

1 I propose^{later} to briefly outline the construction period of
2 these islands when they came into existence, I won't go
3 into that at this time, but I will later on -- when they
4 started.

5 MR. BAYLY: Mr. Commissioner,
6 I asked Miss Allison to go back to maps at the back of
7 the room and to produce -- from which this information
8 was generated and they appear to be approximately 80 mile
9 across the bottom and something less than 80 miles from
10 bottom to top. Now, there is a scale on those maps and
11 perhaps Mr. Gibbs could look at that for a better figure.

12 MR. GIBBS: Well it's just more
13 to get an idea of proportions, how far those lines were
14 apart and to do that, you need to know what distance is
15 covered.

16 A Yes. As I mentioned, a
17 line on there could represent a 600 foot width the
18 way it's drawn on there, but when in reality it may only
19 be 20 feet wide, because that's normally what a seismic
20 line is. If you take it to scale on this map, it would
21 be 600 feet wide which is a pretty wide line. I should
22 maybe outline the drilling activity, and quite a con-
23 siderable drilling activity, although it does not show
24 up too well, right in this area and of course up -- in
25 this area which I've more or less called a Toapolak area,
26 the Taglu area up here, of course with the offshore is-
27 land, and of course the Yaya Lake activity down in through
28 here.

29 THE COMMISSIONER: Toapolak
30 activity being the line running northwest from the Yaya

D. Longlitz
In Chief

1 Lake activity?

2 A Yes. Right, and we
3 also have the Parsons Lake field just in this area here
4 where there is some drilling wells in this area.

5 The next picture is everything
6 superimposed, one on top of the other. The background
7 is a bit hazy here, but this is due to the number of
8 overlays which you had to -- they were using in producing
9 the map, putting them one on top of the other and the
10 darker lines are shaded -- the dark shaded areas will
11 be live shots quite a few years back, like in '71-72, say
12 and then the brighter stuff, of course, would be more
13 current.

14 I'll go immediately south now,
15 to this map sheet which is the 107-B series and you have
16 here Inuvik, the airport, Aklavik, Shallow Bay, Sitidgi
17 Lake, Parsons Lake and I believe the Fskimo Lakes in here.
18 We'll go to the '71-72 activity and you see a granular
19 material operation going on here.

20 MR. BAYLY: You're indicating
21 down --

22 A The Willow Lake area. This
23 here is the Caribou Hills area and there's a certain
24 amount of seismic activity going on here in this particular
25 area. My records indicate here that 214 miles of seismic
26 were conducted out of the permit system here. Again,
27 some activity will have been under the old agreement
28 system which preceded this administration so
29 there could have been other activity here which I
30 wasn't able to obtain. There were two wells drilled

D. Longlitz
In Chief

1 during this time, one in the Parsons Lake area, which is
2 up in here, and the other above Reindeer Station which is
3 somewhere right in here in this area.

4 The following year saw more
5 activity in the Shallow Bay area which is over to this
6 side and also in the Caribou Hills area. There was
7 some, of course, down in the south Shallow Bay as well.
8 My records indicate 1,156 miles were shot and that's
9 represented on this map. There was a well, at that time,
10 cleared off. This is south of Aklavik, down in here.

11 This is an amalgamated picture
12 of the two years '71 to '73. Oops, I went back.

13 This is the '73-'74 yearly
14 activity and we see a shift in the seismic activity from
15 the Parsons Lake area to north of Shallow Bay. It was over
16 this area in here now, it's shifted over up into this
17 area.

18 I indicate here 528 miles of
19 seismic were shot. There is one well there in the
20 vicinity of Shallow Bay which was cleared off in that
21 year, but there were eight wells drilled in the total
22 during this year. We have an amalgamation picture now
23 of '71 to '74 with everything plotted on it. One thing,
24 this is your river access up through here and your over-
25 land access up through this area here.

26 Here, we have the '74-'75 seis-
27 mic activity. I indicate here 124 miles of seismic were
28 shot and this, in my opinion looks -- appears to me to
29 be more of a more detailed type of seismic, you'll note
30 the very -- there's not that many lines and they're in

D. Longlitz
In Chief

1 fairly concentrated areas, here, up in here and here.
2 There's also an access route going across over here to
3 some wellsites up by Parsons Lake.

4 Here is the amalgamated picture,
5 again, from '71 to '75 and again, the concentration
6 appears to be here, the Parsons Lake area, with some
7 down in this area.

8 THE COMMISSIONER: That is the --
9 Shallow Bay was the first area you pointed out, is that
10 fair?

11 A Pardon?

12 Q There is some activity
13 around Parsons Lakes. There is some in the vicinity of
14 Aklavik itself and in the Northwest corner of the map.
15 The activity appears to surround Shallow Bay on the east
16 and west side. Is that about it?

17 A Yes, that's right. Here
18 is the operational series map which is the stuff that's
19 outstanding. You'll see a program here and here, the
20 dotted line fashion which is just out of Aklavik and north
21 of Aklavik there just to the beginning of the Caribou
22 Hills area just across from there, and then some -- this
23 is previous year -- this is probably hasn't been cleared
24 off and it should -- would be probably '74.

25 MR. BAYLY: That is just south
26 of Shallow Bay?

27 A Yes, that's just south of
28 Shallow Bay. Then, again, there was considerable
29 activity in the '74 - '75 around Parsons Lake area.
30 This dotted line around here represents the block land

19311

D. Longlitz
In Charge

1 transfers, the Commissioner's lands. The same with this
2 one over here. This one here represents a proposed
3 I.B.P. site.

4 MR. GOUDGE: Sorry Mr. Longlitz,
5 do you have that mileage in the last map?

6 A Yes, I indicate 336 miles,
7 sorry. This is the amalgamated map of all the seismic
8 under D-8. The dark shaded lines represent the older
9 seismic with the more lighter stuff representing the more
10 recent seismic. My records indicate that there was some
11 2,358 miles seismic were shot.

12 MR. MARSHALL: I'm sorry, Mr.
13 Longlitz, I didn't hear your comment about the solid
14 line near the edge of the Caribou Hills.

15 A This line here. That's
16 the basically, why it's a double line it's an access --
17 it's on the river channels is what it is. It's the
18 boundary also of the I.B.P. site.

19 MR. MARSHALL: That's a proposed
20 site, is it?

21 A Yes. It's a proposed site,
22 yes.

23
24
25 Yes, that's the amalgamated
26 map which includes everything. This, now, is the
27 operational map representing other activity which is
28 not this morning, the wellsites and such things as the
29 geotechnical investigation and this type of things which
30 have not gone on to the final series -- the early series

D. Longlitz
In Chief

1 as you have seen, again, they're geotechnical and
2 granular investigations up here in this area and you see
3 the Parsons Lake area, although it doesn't up in there,
4 there are a number of wells forming a sort of a "U"
5 shaped pattern around there. They have another investiga-
6 tion area there. There are two wells over on this side
7 here plotted and, again, granular investigation down in
8 this area here, the Willow Lake area.

9 This is the total picture, a
10 picture of everything. It doesn't come out that well.
11 There was so many maps, one over top of the other that
12 you can faintly see the background of lines here.

13 Now, I'll go to this map sheet
14 which is the 117-D and that's over to the east of the
15 first map sheet which -- the 107 -- which contains
16 basically the delta. We're coming off to the -- over
17 towards Herschel Island which is here and the Olivier
18 Islands which are down here in this particular area.

19 We have here the 1971- 72 and
20 again, this is -- basically -- what I would -- was off-
21 shore seismic, but it was associated with land based
22 activity, therefore its plotted. Now there could have
23 been other activity in this area which is not on this
24 series of maps but it does give what the land based
25 activity represented and the Yukon boundary is 136-30
26 which is somewhere over here.

27 That's a '71 - 72. This is
28 the 1972 - 73. There was considerable activity in that
29 area. You can just barely make out the island again,
30 in this corner here.

D. Longlitz
In Chief

1 THE COMMISSIONER: That activity
2 is in the lower righthand corner is it the same activity
3 that was on the other maps in the lower lefthand corner
4 of the first map and the top lefthand corner of the --

5 A Right. It's a continuation
6 of that activity, yes.

7 MR. GOUDGE: Mr. Longlitz, if
8 you have mileages as you go through, it would be helpful
9 if you give them to us.

10 A Yes, sorry again. The 25
11 miles from the '71-72 and 72-73, 505 miles offshore and
12 15 miles onshore.

13 MR. BAYLY: Mr. Longlitz, perhaps
14 it would be helpful you would explain whether these
15 maps butt up against each other or overlap.

16 A No, they butt up to one
17 another. The 107 map sheet goes onto here, the 107-B is
18 down below over that particular portion there and 107-C
19 is above it. So that what you saw in the corner coming
20 up would extend here.

21 THE COMMISSIONER: We are seeing
22 four sections of the same map.

23 A Yes, four sections of the
24 same map, that's right, yes. This next picture is an
25 amalgamation of the two years, 71-73.

26
27 This slide here represents a
28 lesser to a lesser degree again, the activity in '73-74
29 and my records indicate 182^{miles} of offshore seismic. Then
30 we have the amalgamated series.

In Reply
to Chief

1 MR. BAYLY: And that amalgamates
2 all three years?

3 A All three years, '71-74.
4 The next map is a '75-76 which is -- now this is the
5 non-land use activity, but I did have the information
6 so I plotted it on this map here. It's completely off-
7 shore. It's an offshore based operation but it was
8 plotted. I note here I did not list the number of lines
9 that were shot there. Then I have an amalgamated map
10 from '71-76.

11 This is the operational series
12 which is the, you know, placed in the active state or
13 the files are not closed. You see here one program of
14 seismic which is 38 miles here and the two offshore
15 islands, what they call the Sarpik location and the
16 Ikkatok location.

17 MR. GOUDGE: Do you have any
18 seismic totals -- mileage total?

19 A 38 miles.

20 Q For the full year that
21 you showed us for the '71-'76 accumulation. I wonder
22 if you have totals for that map.

23 A Yes, I have. This next
24 slide is the amalgamation of the entire program and my
25 records indicate 17 miles onland and 776 offshore.

26 MR. BAYLY: Perhaps you could
27 explain, Mr. Longlitz, two of those dots over by Herschel
28 Island, if they have any significance.

29 A That's in the Yukon and I
30 really can't explain what those are. I believe it may be

D. Langley
In Chief

1 I don't know, it looks like there's a number on that.
2 It could be the Yukon series of that, but I'm not
3 familiar with that portion, as I say. I was concentrat-
4 ing on the Northwest Territories rather than the Yukon.
5 Those maps were part of -- part of them were coming from
6 that area, but I ^{don't} know just exactly what significance
7 they are. Then this is the map sheet which is below
8 the one you just saw and to the west of the Shallow Bay
9 one. There's the other portion of the delta coming up
10 this way in that corner.

11 This is -- in '71-'72, I wasn't
12 able to get anything on it at all, but in '72-'73, this
13 is the yearly map that recorded the activity in this
14 particular area. Records indicates 280 miles onland,
15 the offshore was not calculated here.

16 There is quite a portion in the
17 delta with a small portion getting up into the foothills
18 and the highland area.

19 THE COMMISSIONER: The only
20 offshore area on this map would be --

21 A Just this little portion
22 in here really.

23 Q Mackenzie Bay. That
24 would be somewhere near Whitefish Station, west, wouldn't
25 it?

26 A Yes, I believe so. You
27 see here, now, the 1973-74 programs and it's -- my records
28 indicate here some 432 miles of seismic were shot. They
29 did not appear any drilling activity in this area, only
30 seismic. Then amalgamate into the '72-74, the concentrated

D. Longlitz
In Chief

1 pattern. Then the '74-'75. There's quite a reduction
2 again. Some 108 miles of seismic were all that were
3 shot. There was again, no drilling activity.

4 The next map is the operational
5 series with the proposed program, and, 38 miles proposed
6 there.

7 Then we have an amalgamated
8 picture of the entire amount there. That pretty well
9 completes the slides on that particular area.

10 MR. GOUDGE: Do you have a
11 mileage quota for total for the last quadrants?

12 A No, I have not got a total
13 on that. Yes, will you put the lights on, Pat? I've
14 been asked to comment on some of the development with
15 respect to equipment and techniques, which I am aware
16 of. I do not profess to know the full details of each,
17 but I can indicate some of these for the benefit of the
18 Inquiry.

19 As northern development increased,
20 the industry went through a period of redesigning
21 southern equipment and building new equipment to meet
22 the northern climate and to minimize disturbance to the
23 land. Some examples are the use of the wider pads on the
24 crawler tractors, the wider sleigh runners, and a change
25 from the deep-end cross-bar to the flat track on the
26 nodwell units. More emphasis was required on the super-
27 vision and communication between the field parties and
28 camps in addition to head offices.

29 Pre-scouting of lines with
30 light ground bearing pressure vehicles and helicopter

D. Longfitt
In Chief

1 became a practice --

2 MR. GIBBS: Sorry, sir. I
3 just can't follow this. Will you slow down?

4 A Oh. O.K. Pre-scouting
5 on lines with light ground bearing pressure vehicles
6 and helicopters became a practice, especially in rough
7 terrain. The use of the mushroom shoe to keep the bull-
8 dozer blades raised and minimize the disturbance to the
9 surface also became a practice. The intent here was to
10 use the snow for a surface rather than clear it off.

11 Another experimental design was
12 to outfit heavy oil field trucks with low profile tires,
13 allowing lower ground bearing pressure. The use of the
14 Rologons and its large air sacs was another type of
15 low ground bearing pressure vehicle which is used for
16 scouting and route preparation.

17 Route preparation has become an
18 important part of the operation in that a well snow
19 packed road, not only minimized disturbance^{to the surface} but minimized
20 vehicle damage due to the smoother surfaces and quicker
21 passage. This is very important, especially in rig
22 moves, in the disposal of garbage and the use of a forced
23 air fuel fired incinerator for larger camps became a
24 required method.

25 The technique and use of
26 different materials for drilling pads and staging areas
27 varied in development. Experimental methods and pre-
28 ferences began to surface. Some of the various types
29 are as follows:

30 The use of gravel pads from four to six feet in depth.

D. Longlitz
In Chief

1 The use of wood chip pads

2 The use of wood chip and gravel pads.

3 The use of pilings and steel beams to support rigs
4 and camps off the ground.

5 The use of synthetic insulators such as sulphur foam

6 That's basically are just some -
7 briefly some of the new designs and basic changes that
8 came up with the development. I've also been asked to
9 comment, to give a brief description on the offshore
10 islands for the benefit of the Inquiry and if I might
11 get Pat to go back to the lights again, I will return
12 to one map slide that outlines a lot of the islands and
13 I will briefly describe each island and when it came into
14 existence.

15 O.K., the first island to be
16 built was the Immerk island. It was located off the
17 sandspit of Pelly Island, which is this one right here.
18 This was constructed in the 1972-73 season and was drilled
19 in the '73-74 season between September and December.

20 A second island, the Adgo F-28
21 which is down over here. It was drilled in the -- down
22 over here, south of Garry Island. Now this island was
23 built in August of 1973 and drilled in the '73-74 season.
24 Pullen, E-17 which is now up over here right off Pullen
25 Island, was built in the winter of '73-'74 and drilled
26 in the '74-'75 season in summer.

27 The Unark, L-24 island was
28 constructed in the shallows off Richards Island which is
29 up in here and it was in '73-'74 season and drilled in
30 the '74-'75 season.

D. Longlitz
In Chief

MR. BAYLY: You have indicated a position of the east side of Mackenzie Bay, close to the top of Richards Island.

A -- and the Pelly B-35 which is this one over here, next door to Pelly Island or just off Pelly Island was constructed offshore from Pelly in '74-'75 during the summer and drilled in the 74-'75 winter season.

The Netserk B-44 built in the waters north of Garry Island, which is right there, was built in the summer '75 and drilled in the winter of '75-'76.

We have then the Adgo P-25 which is down in this particular area again. It was built during the summer of 1974 and drilled in February of 1975, and that's again, just south of Garry Island.

The Adgo C-15 island which is, again, down in this particular area was constructed in February, 1975 and drilled commencing April, 1975. We have another one.

The Netserk F-40 which is up here was constructed in the waters farther north of Netserk B-44 and that's off, north of Garry and it was drilled during the summer of 1975 or built in the summer of 1975 and drilled commencing in November of 1975.

The other two islands which is the Ikkatok Island which I pointed out to you before, were located out here and one was -- the Ikkatok 1 is about right out over this location which is straight west of the Adgo Islands and the Sarpik location is

D. Longlitz
In Chief

1 directly south of that one, about down in this area
2 which is -- how would you describe that one?

3 Q Off the map.

4 A Off the map.

5 Q Off to the -- it's in
6 Mackenzie Bay, I take it -- to the west of Garry Island.

7 A The Ikkatok was constructed
8 which is the one directly across from the Adgo, was
9 constructed in summer, 1975 and drilled commencing
10 October, 1975 and the Sarpik one is presently being con-
11 structed. It's down over here. There's a total -- that's
12 a total of eleven islands. O.K., that's -- Could I
13 have the lights, please?

14 That pretty well sums up what
15 I have for the Inquiry. The closing information -- In
16 closing, I presented it on these maps confirms the
17 intensive of exploration in the delta area in the past
18 few years, with a peak of activity occurring in the '72-
19 '73 season. In addition, throughout the few past years
20 innovation and changes in the development of equipment
21 and techniques has progressed as well, and I think that's
22 probably what you can basically draw from the slides
23 that were presented and it gives you an idea of the
24 concentrated activity. That's all, thank you.

25 THE COMMISSIONER: Thank you
26 very much Mr. Longlitz. I certainly found that very
27 helpful.

28 MR. BAYLY: Mr. Commissioner,
29 I understand that this information is contained on the
30 maps at the back of the room and if it appears to you, sir

D. Longlitz
In Chief

1 that the slides would be helpful, I'm sure we can
2 prevail upon Mr. Longlitz to make copies available to
3 the Inquiry, but if it merely duplicates what has already
4 been entered by Commission Counsel as an exhibit, I
5 would propose not to do that.

6 THE COMMISSIONER: Well, let's
7 see how we get along. Maybe we will -- maybe Commission
8 Counsel will want copies of those but Mr. Longlitz is
9 available in Yellowknife and can no doubt accomodate
10 us. It shows the progression, whereas I think those
11 pictures at the back show the accumulation.

12 MR. BAYLY: That's correct, yes.

13 THE COMMISSIONER: Or the
14 cumulative result.

15 A Yes. Each one of those
16 slides -- like, what -- we have a yearly series -- a
17 yearly series and then we took them and made the over-
18 lays with them and put them one on top of the other.
19 Now, I think it would be very hard to portray given each
20 -- you know, I could give a yearly ^{series} of each one, but I
21 don't think I could give the amalgamations as I went
22 through. It would be a little tough to do. They could
23 be done if I sent them south to Edmonton or someplace
24 like that.

25 THE COMMISSIONER: No, no. I
26 don't think we're asking you to do that. Do you want
27 this -- these slides.

28 MR. GOUDGE: We would like to
29 make some arrangement to get them, sir.

30 THE COMMISSIONER: Well, you

D. Longlitz
In Chief

1 speak to Mr. Longlitz.

2 MR. GOUDGE: Yes, I think per-
3 haps at coffee I can speak to Mr. Longlitz and we can
4 work something out.

5 MR. BAYLY: Mr. Commissioner,
6 that completes the evidence in chief of Mr. Longlitz
7 and he's available for cross-examination.

8 MR. GOUDGE: Sir, I am wondering
9 whether this is an appropriate to break for coffee, it's
10 midmorning; before we commence cross-examination.

11 (PROCEEDINGS ADJOURNED AT 10:45 A.M.)

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D. Longlitz
Cross-Exam by Evans

1 (PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

2 THE COMMISSIONER: We'll come
3 to order again ladies and gentlemen.

4 CROSS-EXAMINATION BY MR. EVANS:

5 THE COMMISSIONER: Excuse me,
6 where's Mr. Bayly? Cross-examination, Mr. Evans.

7 MR. EVANS: Thankyou, Mr.
8 Commissioner. Now, Mr. Longlitz, in your testimony, your
9 prepared testimony on page 1, you mentioned exploration
10 activities prior to and after 1971. I'm informed that
11 sometime during that period, the policy was changed and
12 seismic activity during the summer was no longer allowed.
13 Is that correct?

14 WITNESS LONGLITZ: I don't
15 believe -- I think there was one program or there was
16 an experimental program was allowed in '72, I believe.

17 Q There was a change, was
18 there? I mean, at some time summer seismic activity was
19 permitted, and I understand it's no longer permitted,
20 is that correct?

21 A I don't believe that you
22 could actually say that that's exactly the case. I think
23 that it could possibly be looked at, but it's very much
24 of an experimental nature; you have much more supervision
25 and much more control on such an operation.

26 Q What is of an experimental
27 nature?

28 A Summer seismic work.

29 Q Well, you're saying
30 essentially that there never has been any summer seismic

~~Dr. Longlitz~~
Cross-Exam by Evans

1 work, other than a few experimental programs?

2 A From '71 forward. Now,
3 prior to '71 I couldn't tell you on that for sure.

4 Q You don't -- I realize that
5 prior to '71 you didn't have any personal involvement, but
6 do your records show anything?

7 A No, as I say, I was not able
8 to go back and get any records prior to '71, that would
9 substantiate whether there was summer seismic or not.

10 Q I see. Excuse me a minute.
11 Well, Mr. Longlitz, I am informed that there was
12 extensive seismic activity during the summer prior to
13 1971 in the Tuk Peninsula.

14 A There could have been, yes.

15 Q You do not know whether
16 this is --

17 A I can neither deny nor
18 substantiate this. As I say, there could have been, yes.

19 Q Any seismic -- there have
20 been a few experimental seismic programs carried out.

21 A Yes, there was.

22 Q During summer; and was
23 this in permafrost areas?

24 A Yes.

25 Q In permafrost area. Well,
26 what was the result of these programs. What did you
27 conclude from these experimental programs?

28 A Again, I guess I would go
29 back to my own personal opinion and experience on this.
30 In the -- of course -- with the summer program, if you're

D. Longlitt

Cross-Exam by Evans

1 in the highland area, you don't have too much of a
2 problem, but it's crossing lowland, wet boggy areas, that
3 give you the real problem. Highland area tends to hold
4 up quite well. There are -- I guess the thing that I see
5 is on a summer program, there's a lot of concentrational
6 supervision as far as the operators and this kind of thing
7 are, more so than in the winter time; and it makes it much
8 more of a tougher operation I think.

9 Q Well, would you agree that
10 the potential for environmental damage is much higher
11 during the summer?

12 A Depending on the terrain.

13 Q But generally?

14 A Generally, I suppose, yes;
15 I'd have to go along with that.

16 Q Were there any reports on
17 those experimental programs?

18 A I don't recall. I think
19 there might have been one, but I don't recall for sure.

20 Q Are they available to the
21 public?

22 A Again, I don't really know
23 on that aspect, whether they are or not.

24 Q Do you agree that there's
25 a lack of information on the environmental effect of
26 seismic operations?

27 A It depends on your back-
28 ground, on the individual. Some say yes, some say no.

29 Q Well, what would you say?

30 A Are you talking summer, winter

D. Longlitz
Cross-Exam by Evans

1 or what are you referring to, are you being specific,
2 or are you just generally --

3 Q I am speaking generally.

4 A I think there's a fair
5 amount of information available, from the experience
6 and this kind of thing, and I don't think that you study
7 it further.

8 Q Well are there reports that
9 have been published?

10 A You mean specifically
11 pertaining to seismic, or --

12 Q Yes. The effect of seismic
13 activities on the environment.

14 A I can't recall in my own
15 mind reports, and this kind of thing on that topic, so
16 as I say, I don't tend to get involved in all the reports
17 and this kind of thing, so I couldn't really answer that
18 one.

19 Q But you're chairman of the
20 Land Use Advisory Committee, is that correct?

21 A Yes, but I have a lot of
22 help --

23 Q I realize that, but surely
24 these things would be brought to your attention if they
25 were --

26 A Yes, but as they say, if
27 you have an environmental scientist, or people on staff
28 that can look at these things and that is their task, it's
29 not up to me to have to go through everything.

30 Q So to your knowledge there

D. Longlitz
Cross-Exam by Evans

1 aren't any reports on --

2 A Oh, I wouldn't say that, no,
3 I would say there probably are reports, but I'm not aware
4 of them.

5 Q So you're saying, there are
6 reports, but you're not aware of them; or you think there
7 are reports, but you're not aware of them.

8 A For instance sir, you know
9 there are studies that have been carried out in relation
10 to -- I know of one report for instance where seismic was
11 conducted and they studied the vegetation and the effects
12 where the seismic was and kind of thing. I'm aware of
13 one report, but how many or in what categories, I --

14 Q Could you find out for us?

15 A Possibly I could, yes.

16 Q I understand you'll be
17 appearing again, at the implementation part of this
18 Inquiry.

19 A That's news to me.

20 Q I'm informed that you're
21 likely to be appearing at that time. Is that correct,
22 Mr. Goudge?

23 MR. GOUDGE: I have no knowledge
24 of that.

25 THE COMMISSIONER: In any event,
26 Mr. Longlitz is in Yellowknife. He can be reached on the
27 telephone, or one can always call him at his office.

28 MR. EVANS: Right. Well, I
29 wonder if you could undertake to find out if research has
30 been done to this, and provide us with a report.

D. Longlitz
Cross-Exam by Evans

1 THE COMMISSIONER: Mr. Longlitz
2 appeared before the Inquiry last fall, and discussed the
3 environmental consequences of seismic lines. He pointed
4 out the damage done by some, he pointed out how more
5 improved methods had resulted in less damage in recent
6 years. It was a very helpful and worthwhile presentation
7 and it's in the transcript. That's the report, that's
8 Mr. Longlitz's report to the Inquiry. If somebody else
9 had written a report and Mr. Longlitz can lay his hands
10 on it, I'm sure he will and he'll let us have it.

11 MR. EVANS: Well, I apologize
12 Mr. Commissioner.

13 THE COMMISSIONER: You don't
14 have to apologize, I'm not blaming anybody; but Mr.
15 Longlitz has already discussed this with us at some
16 length.

17 MR. EVANS: I tried to
18 read Mr. Longlitz's previous testimony, I wasn't able to
19 read it all. As you know I wasn't present at that
20 time.

21 THE COMMISSIONER: No, I know.

22 MR. EVANS: What I'm trying to
23 establish --

24 THE COMMISSIONER: I just don't
25 want to do it all over again.

26 MR. EVANS: I understand your
27 point. What I'm trying to establish is that there doesn't
28 appear to have been a lot of research done into this
29 area, and that we don't really know very much about
30 the environmental effects. Would you agree with that

D. Longlitz
Cross-Exam by Evans

1 statement, Mr. Longlitz?

2 A Yes, well as
3 I say, it's a personal preference, and I've seen some
4 of the reports and I work on what my people tell me, and
5 this type of thing; and to put me on the spot and say
6 there's not enough data available, well, I would have to
7 go back and discuss this further with the people that,
8 such people as ALUR , and various people like this, who
9 are knowledgeable of these reports, and this kind of
10 thing, in order to answer your question properly.

11 Q So you wouldn't at this
12 time like to venture an opinion on whether or not we
13 have sufficient information?

14 A No.

15 Q I wonder if you could
16 outline for me the process ^{of} evaluating one of these
17 applications for a permit to conduct seismic, rather
18 hydrocarbon operations? Particularly in sensitive areas.

19 A Well I guess I could
20 refer back to my previous testimony and go over that
21 again. As you know, under the regulations, applications
22 before operations are submitted to the Department of Indian
23 and Northern Affairs, these applications are first of all reviewed
24 for acceptable information, whether there's enough information on
25 there to determine where the program's going to be conducted and
26 when, and this type of thing, as per an application form
27 which is set out in the regulations; and following this
28 then they make a wide distribution, they go to a Land Use
29 Advisory Committee, they go to our local field offices,
30 which in turn distribute them to the local community

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Cross-Exam by Evans

1 involved in that particular program, and if it's in a
2 very sensitive area, there may be -- we have a certain
3 environmental group in Ottawa, which we may consult with
4 on the programs, we have also an environmental scientist
5 who also will look at these aspects, on the Advisory
6 Committee, of course; and I have mentioned that before.
7 The members on the Advisory Committee also represent
8 the concerns from their point, and it's on that basis
9 then that a permit is drawn up with conditions in it
10 and the permit is issued.

11 Q Now, what procedure would
12 you take if it was decided that there wasn't enough
13 information? Would you delay issuing the permit?

14 A There is that procedure
15 mechanism in there, yes. There is such an approach,
16 whereby you can have the program go on, with a study
17 being documented alongside of it to determine the effects,
18 you can go that route. You can go to the route of no
19 programs. There's a number of routes which are open
20 within the regulations themselves. There's, as I say,
21 there's a section in there with a six month study.

22 Q Has it occurred very often
23 that a program has been -- a permit for a program has
24 been refused, because there wasn't enough information
25 on the environmental damage?

26 A There have been -- yes,
27 there have been programs yes.

28 Q A number of them?

29 A I don't know exactly how
30 many, I can think of a couple, offhand, yes.

D. Longlitz
Cross-Exam by Evans

1 Q Now Mr. Longlitz, I wonder
2 if you could describe for me, multiplicity seismic
3 operations?

4 A Not in too much detail. I
5 know what it entails, or what it covers; but to get down
6 to specifics of the thing, of course, it gets pretty
7 technical. Basically, multiplicity seismic consists of
8 a three line pattern cut instead of a single line pattern
9 and it's done because you're not able to obtain records
10 from the conventional type of seismic which is a single
11 line; and as I say I think the lines are roughly 150 feet
12 apart, three lines running parallel with one another; and
13 then there's a system of shooting on the lines.

14 Q Is this a method that's used
15 in the north?

16 A It was used in the north,
17 yes, to a degree, but only used after conventional seismic
18 proved out that they couldn't pick up data from it.

19 Q You say "was", is it no
20 longer used?

21 A I don't believe there's
22 any -- no proposals.

23 Q Nobody's doing it anymore?

24 A I don't believe so.

25 Q Is that because of complaints
26 of the damaging effect of it on the environment?

27 A I don't believe so. I think
28 the cost factor involved alone, in shooting triple line, in
29 comparison to conventional seismic, is a deterrent in
30 itself; and I think also the company that was doing it

D. J. Evans

Cross-Exam by Evans

1 is probably been able to get sufficient records so that
2 they --

3 Q You say "the company", was
4 there only one company that used it?

5 A Yes.

6 Q Which company was that?

7 A I suppose it's common
8 knowledge, it was Shell Oil.

9 Q Shell?

10 A Yes.

11 Q I understand in the winter
12 of 1973 - 74, when they applied for a permit to conduct
13 the multiplicity seismic operations, there were complaints
14 from the native organizations and that the approval was
15 held up and that eventually a modified multiplicity
16 program was approved. Is that correct?

17 A Yes, I believe so.

18 Q Could you describe that
19 modified program?

20 A Yes, they tried to first
21 of all cut down the number of miles that would be covered
22 by a conventional type, and this they did; and it was
23 also designed to still hopefully try and get sufficient
24 records by using this different method, and when there
25 was a -- I don't, I think that it wasn't that successful
26 either, they weren't able to obtain the records as well
27 as they were on the other programs. You're looking at the
28 fashion, they tried two types: a V-pattern off a main
29 line, and they also tried a herring-bone style, which is
30 a line with a series of V's cutting off it on an angle.

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Cross-Exam by Evans

1 This type of line also is from an aesthetic point of view
2 does not -- you don't notice it as much as you notice
3 a three-line pattern, for instance, if you're flying an
4 aircraft, because the lines going off to the side if you
5 look at it from the end you don't see the one side; and
6 then if you look at it from the outside you only see
7 a certain portion of this. But I don't think the aesthetics
8 were the key factor, and I think it was the fact of
9 trying to cut down and minimize the amount of disturbance
10 to the land and still able to obtain records.

11 MR. BAYLY: Mr. Commissioner,
12 perhaps it would be helpful if Mr. Longlitz could use
13 that blackboard, and illustrate that.

14 A Conventional
15 is two-line -- three-line type program, like so. The
16 area, was a series like this, the V portion with a
17 series like this.

18 THE COMMISSIONER: What do you
19 call that one?

20 A That's what I call a
21 V-program.

22 THE COMMISSIONER: V-Program?

23 MR. EVANS:

24 Q Did the Land Use Advisory
25 Committee take any action to determine the pros and cons
26 of this type of operation, its effectiveness, and also
27 its effect on the environment?

28 A I'm sure that they must.
29 I don't recall specifically, but I would expect they
30 would, yes.

Q So you're saying that they

11. Long 111
Cross-Exam by Evans

1 did take action but you don't know what it was?

2 A Well, I can't recall
3 specifically the particular instance, all I know is the
4 basic of what the proposal was at that time. I was not
5 either in Yellowknife at that time, I believe I was up
6 here in Inuvik.

7 Q Well, was it felt in your
8 department that sufficient research had been done into
9 this to determine whether or not it was a good program?

10 A I believe that if I can
11 recall, I believe that there was considerable research
12 right through to our A.L.U.R. people and the rest, in
13 trying to figure out why the program was necessary.

14 Q Since you say that this
15 research was done, but you don't know --

16 A I'm saying, I'm talking
17 basically about the technical aspect of the thing; why
18 is it necessary to go to this extreme, say, on a program.
19 I think in conjunction with this there was also a study
20 proposed, either in that year or the year after, to go
21 along with the program, but then there was a cutback in
22 funds and the study did not go ahead.

23 Q So there was a study
24 proposed but it didn't take place?

25 A Yes. That was either that
26 year or the year after, I can't be familiar; but that
27 was only pertaining -- it wasn't, should I say to look
28 at -- I think it was pertaining to muskrats.

29 Q Well, I think I'm getting
30 confused. You said originally that there was research

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Cross-Exam by Evans

1 done into the effectiveness, and now you say that there
2 was a study proposed --

3 A You said research, and I
4 believe I said that it was taken back ^{through} our people in
5 Ottawa who discussed the various aspects and what I was
6 referring to was the technical aspects to a degree;
7 which is the seismic data and information that they --
8 and the reasoning for having to go to this extreme.

9 Q I see. Well, what about
10 the effects on environment?

11 A They were probably considered
12 as well, but I don't know that you would look at making
13 out a report on that basis.

14 Q So really, not very much
15 has been done into the environmental effects of these
16 programs?

17 A Well, again as I say,
18 there are probably reports on a seismic line itself,
19 an individual seismic line being run, which would pertain
20 to this as far as vegetation and this type of thing,
21 surface vegetation removal, and this type of thing. Now,
22 what are you referring to in specific -- specifically.
23 Are you referring to something specific on the line, or
24 are you talking generally? You know, it's very hard --
25 is it aesthetics you're looking at?

26 Q No, I'm not concerned
27 particularly really primarily with aesthetics, I'm
28 concerned with the effects on wildlife in the area.

29 A You know as I mentioned
30 there was -- I don't know whether it was that year or the

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Cross-Exam by Evans

1 year after, but there was a proposed program to go ahead
2 and -- I think there is one going ahead this year as well.

3 Q You think there is a
4 program underway at the moment?

5 A M-hm.

6 Q Well, is this an area you
7 think should be studied in more detail?

8 A It works on a basis of
9 various -- like, we have a group in Ottawa who puts
10 together proposals on this type -- as I mentioned earlier
11 I believe it's an Environmental Assessment Group
12 now; but they do study programs, and put out reports, or
13 gather -- have reports done on various topics throughout
14 the year, and I think that you have to talk to them on
15 what is programs for study and this type of thing.

16 Q Okay. Now I believe you
17 said earlier that there hadn't been any multiplicity
18 operations since 1974, is that correct?

19 A I don't know about the
20 years here. I know they started up in a year, and then
21 they carried forward into another year, and whether there
22 was a third year or not, I don't recall.

23 Q There aren't any underway
24 at the moment, to your knowledge?

25 A No.

26 Q The witness is nodding his
27 head, no.

28 A If there is, as I say, I'm
29 not aware of it.

30 Q Yes, I'm just asking from

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Cross-Exam by Evans

1 your personal knowledge, I realize that there may be things
2 that go on that you don't know about. Now, you just
3 discussed A.L.U.R., that's the Arctic Land Use Research
4 program, is that correct?

5 A I mentioned it.

6 Q Yes, you mentioned it, and
7 you said something about it being replaced by something
8 else?

9 A I don't think I said it was
10 replaced, I think they've changed the name is about all.

11 Q Well what's it called now?

12 A I'm not really sure, as
13 I said, I think it's the Environmental Assessment Group,
14 now, is what it's called; but I don't believe it's called
15 A.L.U.R. anymore.

16 Q Well, what was the purpose
17 of this organization?

18 A Well, the title was Arctic
19 Land Use Research, and they were to look into research
20 related to development in the north, I believe that was
21 what I would have to work on.

22 Q Well, have you encouraged
23 them to look into seismic problems?

24 A Yes, we've talked to them
25 back and forth on it. Because one of their reports is on
26 seismic operations.

27 Q They would come to you and
28 ask you what needed to be looked into.

29 A Yes, that is a common thing
30 in preplanning.

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Cross-Exam by Evans

1 Q Well, this seismic report,
2 is it available or is it still in --

3 A I believe all of their
4 reports are available to whoever wants them, yes.

5 Q You said that you were
6 encouraging them to conduct seismic research.

7 A M-hm.

8 Q Now, deciding whether or
9 not to grant a permit for seismic work, is any consideration
10 given to native people, who have trap lines and so forth,
11 in the area?

12 A Yes, I think there's a
13 number of things. There was a direct offset to that is
14 some of the monitoring programs that were carried on
15 where monitors were hired, things along that line, yes;
16 and I think that such considerations is not leaving a
17 furrowed snowplowed line, and knocking down the banks
18 wherever skidoo crosslines were, and this sort of thing;
19 yes, I believe there's consideration.

20 Q How extensive an effect
21 does seismic work have on the land? You know, to cut a
22 line through the bush, or whether or not you're above the
23 treeline, would you class that as a substantial effect on
24 the environment?

25 THE COMMISSIONER: Why are you
26 asking Mr. Longlitz this? What does it matter whether
27 he thinks it's substantial or not. We've seen seismic
28 lines, some of them have caused great damage, some
29 appear not to have caused any damage to speak of.
30 We've been to the communities, and we're going to others,

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Cross-Exam by Evans

1 we've heard what they have to say about the consultation
2 there has been before seismic permits have been granted.
3 We've heard what they have to say about the damage
4 caused. Now, if Mr. Longlitz has seen seismic lines
5 cut through the bush, and he says it's substantial or
6 insubstantial, I don't see that that helps me. Certainly
7 it's substantial for that twenty feet of right-of-way,
8 until it grows up again, if it does; but I just don't
9 think this is getting me anywhere, Mr. Evans.

10 MR. EVANS: I'm inclined to
11 agree with you Mr. Commissioner, and I won't pursue that
12 any further. I don't suppose it would be of any help to
13 have Mr. Longlitz answer that question. I wonder, taken
14 from what the Commissioner says, that there are situations
15 in which there are substantial effects on the environment.
16 Has your organization thought about what we can do to
17 minimize the impact? Do you have any proposals to that
18 effect?

19 A What are you referring to
20 here?

21 Q Seismic lines.

22 A I mean, are you saying
23 you've got some other method in mind, that can be done,
24 is that what you're thinking of?

25 Q Yes --

26 THE COMMISSIONER: One method
27 is not to do them, not to cut them in the bush, just
28 forget about them, then there's no impact. That's
29 method A. You in this paper here, listed some of these
30 changes, you were reading from something other than this

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Cross-Exam by Evans

1 paper, I thought. I was afraid to say so, I must have
2 lost my place. Here it is here, you said these improvements
3 and so forth. Well are there any specific improvements
4 beyond those, that are listed at the bottom of page 4
5 onto page 5. Well, if you would argue.

6 A It's very hard to argue that
7 point because if you're talking, say, technique, you're
8 talking just one seismic program versus another seismic
9 program; and so you can't say that, you know, is the
10 technology of one company better than the technology of
11 another company. That's why, as I say, it's very hard --
12 like he's referring to, can it be conducted from the air,
13 or something like this. I'm certainly not aware of
14 anything like that at all, as far as my own personal
15 opinion is, I don't think there's any other way you can
16 get the records, unless you get on the ground and conduct
17 the seismic lines.

18 THE COMMISSIONER: But no one's
19 suggested that there's a new technology in the offing --

20 A No. There is definitely a
21 better record capability. You know, you have the technology
22 advances in the sense of the geofoams they use, you know,
23 various things along this line, so it is going to be able
24 to upgrade their systems and this type of thing, but I
25 don't think there's ^{been} any change in the sense of not having
26 to be on the ground at all, that I'm aware of.

27 MR. EVANS:
28 All right. Now, I have read
29 your previous testimony, with respect to the Territorial
30 Land Use Regulations, and now, I understand that there's
only a thirty day review period, is that -- for application --

D. Longlitz
Cross-Exam by Evans

1 is that correct, on a normal application?

2 A Yes, on a normal application.

3 Q Now, I wondered if you
4 could provide a more detailed historical perspective on
5 why such a short period was established for reviews?

6 A I guess basically again,
7 all I can draw is that these regulations were drawn up
8 prior to my being on the scene, but I can think of some
9 considerations offhand that may have been used. Some of
10 them are that in planning an operation, even I think
11 ourselves, when we plan something, we kind^{of} set out an
12 expenditure aside, and this type of thing, and we might
13 set it out quite some time in advance, type of thing,
14 and to plan operations, and we have to know in a certain
15 time that we're going to be able to spend that money
16 too, and I think that that's one of the considerations,
17 is that you have -- that you don't drag on making a
18 decision on things. You have to know that you're going
19 to have some deadline by which you're going to be able
20 to know where you're at. I think at the same time though
21 that it's built into a system of preplanning on the part
22 of people that were going to spend this money, to get the
23 plans in, in advance, so that they would have sufficient
24 information, and as I say, there's a built-in procedure
25 in there to ask for further information, if you don't
26 enough.

27 So, it kind of sets the example
28 now -- I don't know just what all the considerations
29 were, really, in setting that time limit. I know that
30 it was discussed, the way you make regulations now is

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Cross-Exam by Evans

1 you discuss them with the various people who have concerns,
2 and it's all their inputs together, so that's why it'd
3 be very hard to know exactly what all the inputs were,
4 and why the thirty day limit was put on it.

5 Q Now, did I take you to mean
6 that one of the reasons at least for such a short review
7 period is that the company has decided to go ahead, and
8 they've allotted the money, and they'd like an answer
9 back quickly?

10 A Now they have some idea --
11 they have, let's say, come to grips with an idea of
12 where they're going to work, where they want to work,
13 put it that way, and that's probably one of the factors;
14 and their program is basically based on economics, to
15 a degree, and data that they have to get out, and they
16 would have to have an answer. I think back to my own
17 personal experience and operational -- government
18 operations, for one thing, and I can think back in my
19 own experience of government not making a decision, and
20 I think that that's probably one of the reasons that there
21 was some time limit put in there. Why there was a thirty
22 day, I couldn't really say, but I know probably if I was
23 on the other side of the fence, that I would sure want
24 a decision made by some date and deadline, because it
25 gets to the point where you don't have -- you know where
26 you're at, it's pretty bad. Especially when you're
27 planning an operation, and with the cost involved, that
28 you find out from these programs, for instance.

29 Q Well you mentioned that
30 this was the general procedure, but it wasn't -- that there

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Cross-Exam by Evans

1 were exceptions, is that correct?

2 A Well, in the regulations,
3 there is a delay mechanism, in the sense that you can
4 declare six months study, or once you come over the
5 thirty days, yes.

6 Q So you could, in other
7 words, tell them they had to wait while you conducted a
8 six-month study. Is that done very often?

9 A Not very often, it has been
10 done, yes. But not very often.

11 Q Well, do you think, as a
12 general rule, that thirty days is long enough to review
13 these applications?

14 MR. MARSHALL: Mr. Commissioner,
15 if I might interject, surely this isn't a review of the
16 manner in which the department that's charged with the
17 responsibility under statute issues permits to do seismic.
18 I hesitate to interrupt because it seems to me that my
19 learned friend is generally not getting the sort of
20 answers that he wants; nonetheless, we could go on this
21 vein for some time, and I don't really think that it
22 advance the work of the Inquiry.

23 THE COMMISSIONER: Well, I agree
24 with you. What use is it to me to know whether Mr.
25 Longlitz thinks thirty days notice to all concerned is
26 sufficient notice.

27 MR. EVANS: Well, Mr. Commissioner,
28 I'm again trying to establish a point I guess that I've
29 hammered away on a number of times, and that is that
30 not only do we not know enough about conditions -- the

D. Longlitz
Cross-Exam by Evans

1 effect that these activities are going to have, but that
2 the decision process is hurried, and there is an oppor-
3 tunity to even isolate the need for further information,
4 and that's the point I'm trying to make. Now, I guess
5 I would agree with you that that is kind of peripheral
6 to your terms of reference.

7 MR. BAYLY: I note that it is
8 peripheral, Mr. Commissioner. I think it may be helpful
9 if Mr. Longlitz can say whether he thinks that's enough
10 time to do the job that he's faced with, and that is
11 in no way poking at the government or anything, he's got
12 the job to do and he's in the best position to tell us
13 whether it's difficult to do that.

14 THE COMMISSIONER: I'm not
15 concerned whether the evidence is likely to show that
16 the government has done something that others might think
17 should not have been done. It's a question of relevance.
18 I just don't see -- to determine the periphery of what
19 we ought to be examining isn't easy, and I don't want
20 to exclude anything, that may in the end turn out to be
21 helpful, but if we go on and on ^{with} Mr. Longlitz, trying to
22 obtain information from him which for the most part he
23 doesn't seem to have, opinions he is either not qualified
24 to express or unwilling to express, and covering ground
25 we have heard before. I've heard about these seismic
26 lines, in the villages, all up and down this valley.
27 I've had exhibit after exhibit introduced, in hearing
28 after hearing in the communities, which the people say
29 shows that they don't get any notice, there isn't enough
30 time; that often they only receive notice that someone's

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Cross-Exam by Evans

1 applied for seismic line after the bulldozer already in.
2 This is nothing to do with Mr. Longlitz, but I've
3 certainly been given a lot of evidence on the subject,
4 and I don't know that it's helpful to me to hear any more

5 MR. EVANS: Well, Mr.
6 Commissioner, that's precisely the point I'm trying to
7 make; that there isn't sufficient notice, I think that's
8 obvious, and that people in the communities often don't
9 get a say.

10 THE COMMISSIONER: The people
11 in the communities have told me that, they're the ones
12 that claim they didn't get the notice; to have Mr.
13 Longlitz express an opinion on it doesn't seem to me
14 to be very helpful. We had the best evidence which is
15 people who claim they didn't receive notice.

16 MR. EVAN: I imagined that you
17 received that evidence but I didn't know as a fact that
18 you'd been told that by people in the communities.
19 The other point that I'm trying to make is that -- and
20 forgive if I'm giving evidence, I don't intend to,
21 because these are things that I wish to ask Mr. Longlitz
22 about, but that the process appears to be that it goes
23 through his committee and they make a decision, and at
24 the same time, the people in the community are making
25 a decision; and the people in the community don't have
26 any technical information at all, or any way to really
27 understand what's happening; and I'm suggesting that
28 a better process would be one where it went through
29 his committee, and after they'd made a preliminary
30 finding, then it went to the people in the community,

D. Longlitz
Cross-Exam by Evans

1 and they were advised as to the technical aspects, and
2 then they could have an input; and then it goes back to
3 his committee to make a final decision.

4 THE COMMISSIONER: All right.
5 Well now --

6 MR. EVANS: And maybe I can ask
7 Mr. Longlitz to comment on that. That's where I'm trying
8 to lead the Inquiry, Mr. Commissioner. I'm not maybe
9 getting there --

10 THE COMMISSIONER: All right.
11 Let's utter a prayer that no one objects, and let's ask
12 Mr. Longlitz for his comments, and see if that gets us
13 over it.

14 MR. EVANS: Well that's where
15 I've been trying to go in the last five or ten minutes,
16 and I realize that I haven't been getting there very
17 fast.

18 MR. MARSHALL: Shall I leave
19 for lunch now?

20 MR. EVANS: Well you have my
21 permission, Mr. Marshall, if you wish.

22 THE COMMISSIONER: Well, let's
23 settle down, and now that we -- well, you heard what
24 Mr. Evans said, what do you think of that?

25 A Well, I think
26 personally, one thing he may have been alluding to is
27 there have been amendments to the regulations circulated
28 through the councils and various groups in the Northwest
29 Territories, and there is some indication to a 42 day
30 period as compared to a 30 day period; and this may be,

D. Longlitz
Cross-Exam by Evans

1 although I don't know exactly again why the deadline, and
2 I mentioned it earlier on, why the deadline is put in
3 there, but I suspect that that's part of it, is that they
4 want to extend the period to allow for further
5 input from the communities and this type of thing. That's
6 understood. There is one thing I will say though, that
7 in the present system, the applications do reach the
8 community; we make sure of that, and we also make sure
9 that we do have a response back from them, before the
10 permits are issued; and that there may be confusion as
11 to whether an operation has gone on, or whether it is
12 going on, and the permit is issued, and this type of
13 thing, but I think in the past, farther back, when the
14 program was first getting established, there were
15 indications of that; but I think that recently and in
16 recent times, that I think that -- I don't know of
17 locations where this has happened; but in each case there
18 may be, there may have been a problem or something like
19 this, but normally, that's the procedure, is to make
20 sure that the comments are in from the communities as
21 well. Now, you're suggesting a different procedure,
22 I'd have to look at the time constraints and everything
23 on it to see how we'd be able to work the thing in.

24 MR. EVANS: Well, obviously it
25 would take longer, but is it true, that under the present
26 system that the evaluation goes ahead simultaneously,
27 in your office and in the community?

28 A Yes.

29 THE COMMISSIONER: I think that --
30 doesn't that pretty well cover the ground, that we --

D. Longlitz
Cross-Exam by Evans

1 MR. EVANS: Yes, it does. I
2 have one further question, in the area, that I wanted
3 to ask Mr. Longlitz.

4 Now, when it goes out to the
5 community, is that the nearest community to the operation?

6 A That depends. Some of it's
7 based on the hunting and trapping areas, some is
8 based on our local people's understanding in talking to
9 the communities. I think of an example, of when it was
10 offshore there, I think all three communities
11 were involved. There's no such thing as you're cutting
12 one and getting the other. I know of applications that
13 were sent to one, they said this isn't our area, and they
14 sent it back.

15 Q So it's conceivable that
16 the application would be sent to three or four or even
17 more communities?

18 A Yes. There's no discretion
19 to limiting the things.

20 Q The only other thing that
21 I wanted to raise was in reading over your testimony,
22 previous testimony, there appeared to be a number of
23 things that you were asked about, and you said that you
24 didn't have the information. Now, maybe I can discuss
25 this with you later, but I wonder if you could undertake
26 to provide that to the Commission, information as to
27 prosecutions, and security deposits, and things of that
28 nature. Would that be in order, Mr. Commissioner, for
29 me to discuss that privately with --

30 THE COMMISSIONER: Oh yes, by all

D. Longlitz
Cross-Exam by Evans
Cross-Exam by Gibbs

1 means.

2 MR. EVANS: Okay, rather than
3 taking any more of your time.

4 THE COMMISSIONER: Right.

5 MR. EVANS: Okay, thank you
6 Mr. Commissioner, I haven't got any further questions.

7 THE COMMISSIONER: Well thank
8 you Mr. Evans, and don't let me dissuade you from pursuing
9 the line questioning you think you ought to. You
10 certainly haven't been dissuaded so far.

11 (LAUGHTER)

12 I don't want you to get the
13 feeling that you're being singled out for special
14 treatment.

15 MR. GOUDGE: Mr. Gibbs is next
16 for the treatment.

17 CROSS-EXAMINATION BY MR. GIBBS:

18 Q Mr. Longlitz, you're not
19 here to either praise or condemn seismic operations, I
20 take it.

21 A Yes, that's right.

22 Q You're just here to narrate
23 what happened.

24 A Yes.

25 Q And what you narrated was
26 a normal exploration in a new exploratory area?

27 A Yes.

28 Q That it begins with large
29 grid seismic coverage, with the lines a long way apart
30 and the shot holes a long way apart.

D. Longlitz
Cross-Exam by Gibbs

1 A Yes.

2 Q And then that's usually
3 followed up with more detailed seismic work?

4 A Yes.

5 Q And that's frequently
6 followed up with drilling, if the seismic shows there's
7 some prospects?

8 A Right.

9 Q And that again is frequently
10 followed with more detailed seismic so that you can
11 marry the seismic to the drilling results?

12 A Yes, that could be one.

13 Q And in due course, the
14 amount of seismic activity reduces and the drilling
15 activity increases?

16 A Yes.

17 Q And that's the stage you're
18 at now in the delta area?

19 A To a degree yes, I think
20 that we saw now a recent drop-off in drilling as well;
21 the activities, of say, the seismic activity increased
22 in '72 - '73 season as well the drilling, and then there
23 was a continual drop-off, and this year I think we saw
24 a further drop-off in the drilling, and of course seismic
25 dropped off considerably.

26 Q And that's what you expect
27 in any exploratory area?

28 A I believe so, yes.

29 THE COMMISSIONER: Well, when
30 Mr. Gibbs says that you expect all of this, are you

D. Longlitz
Cross-Exam by Gibbs

1 familiar with any other exploratory --

2 A When I think
3 back in the northern Alberta area, which I looked at
4 briefly on my own, yes, they are similar.

5 MR. GIBBS:
6 Q And you may now see some
7 more continued activity offshore, but you would expect
8 more seismic activity offshore than on land, in the
9 future?

10 A I think that it's such
11 a complicated -- one of the things I think I pointed
12 out in my presentation was it seemed to be such a
13 complicated field, that it's very hard to really prophesize
14 which way they're going to go, whether offshore
15 or onshore, I think it's basically determined on the
16 wells that are drilling and this type of thing now,
17 because that seems to move.

18 MR. BAYLY: Mr. Commissioner,
19 that may be beyond his competence, and something that
20 Mr. Gibb's clients could tell.

21 MR. GIBBS: Well, I
22 expect if the witness doesn't know, he'll say so.

23 THE COMMISSIONER:
24 Mr. Horsfield did cover that area.

25 MR. GIBBS: And in every case
26 Mr. Longlitz, ministerial approval or departmental
27 approval is required before the program is carried out?

28 A Yes, on all
29 land use operations.

30 Q And now at least, in every
case, there is some supervision of the program while it's
being carried out?

D. Longlitz
Cross-Exam by Gibbs
Cross-Exam by Goudge

1 A Yes.

2 Q And there is a subsequent
3 inspection after the program is completed before the
4 operator is released of his obligation, and gets his
5 security deposit, or whatever it is refunded to him.

6 A • Yes, if there's a security
7 deposit, he will get it.

8 Q To repeat the Commissioner,
9 I think I'm repeating him, the only alternative is not
10 to have any seismic at all, or carry on this supervisory
11 process?

12 A If you're talking basically
13 of seismic there, if you're going to get the records
14 and that, you'll probably have to go that route yes.
15 From my own personal knowledge anyway, which is
16 very limited.

17 Q I imagine from your
18 experience you can follow the next step and say without
19 seismic activity you're not going to get the wells?

20 A I believe so, yes, that's
21 quite true.

22 Mr. GIBBS: That's all, thank you.

23 THE COMMISSIONER: Mr. Marshall.

24 MR. MARSHALL: No questions, sir.

25 THE COMMISSIONER: Mr. Goudge?

26 CROSS-EXAMINATION BY MR. GOUDGE:

27 Q Mr. Longlitz, you've shown
28 us a drilling pattern of seismic in the delta and offshore
29 over the last five or six years. I take it you'd agree
30 that while seismic may be necessary for wells, a variety

D. Longlitz
Cross-Exam by Goudge

1 of techniques could be used for seismic operations?

2 A There is a variety of
3 techniques used. I think that this is dependent on the
4 company and what kind of coverage they want, depend on
5 their shot point spacings, various things along this
6 line. It's a technique which each company sets up
7 individually, and it's set up on what they expect to find.

8 Q And a variety of equipment
9 is available for use to do the variety of types of
10 seismic?

11 A Yes.

12 Q And, some of the equipment
13 is presumably of lesser or greater environmental impact?

14 A Yes, I would say, in that
15 sense, some takes more preparation than others.

16 Q The lighter the equipment,
17 the less the environmental impact, in general terms?

18 A Lighter the ground bearing
19 pressure, sounds like more --

20 Q Yes. So that it isn't
21 simply a question of no seismic at all, or seismic. There
22 are gradations within seismic, when one looks at it from
23 the point of view of environmental impact?

24 A Yes, I guess I'd have to go
25 along with that.

26 Q Now, you've shown us a
27 seismic pattern, that peaked I think you said in the 1972
28 '73 year. Is that correct?

29 A Yes.

30 Q And you've shown us a grid,

D. Longlitz

1 that began with widespread seismic lines, and then began
2 to focus. Those seismic patterns are carried out as I
3 understand it by a variety of independent companies. Is
4 that so?

5 A You mean, not the actual
6 construction of them, you mean --

7 Q I mean the actual seismic
8 work has been carried out over the past six years, that
9 you spoke of, by a variety of independent companies?

10 A Yes.

11 Q And each company maintains
12 unto itself the information it receives from seismic
13 operations?

14 A They may maintain it, they
15 may wish to sell, and this type of thing.

16 Q Yes. Seismic information
17 is in the first instance private property, which seismic
18 companies may or may not sell, as they wish.

19 A The other thing is that
20 maybe I should have mentioned, is that it's not necessary
21 that one company will be responsible for all the
22 seismic; it may be a conglomerate that'll go together
23 to get the information.

24 Q Yes, I understand that.
25 But if one company wishes seismic records for an area
26 that it has not tested, but another company has, it
27 can either do the work itself, or purchase the results
28 from the previous seismic operator.

29 A If that is the only -- if
30 they feel that the data that was received was good -- how

1 do you say it -- was done in a manner that they can really
2 draw on it.

3 Q Yes. They may well wish
4 to do their own in any case, even if they could purchase
5 the predecessors results.

6 A Yes.

7 Q So isn't it fair to say that
8 even though you've shown us a grid, there is no
9 guarantee that any area for which there's been seismic
10 work shown in the past, will be empty of seismic work
11 in the future?

12 A No, I think it -- my own
13 opinion would be on that, is that you have a certain
14 amount but in order to drill a well or something you're
15 going to probably want to go in and be a little more
16 specific yet.

17 Q Well, let me suggest to
18 you that just because there's been seismic work in one
19 area in the past, there very well may be even more seismic
20 work in the same area in the future, depending on for
21 example, new companies wishing information for that
22 area, new techniques developing to do seismic work, and
23 that kind of thing.

24 A I think I would have a
25 little trouble in really answering that one, because I
26 don't really know myself how much a company will rely on
27 other people's data, and if they do indeed rely on that
28 to a great degree, you may see other seismic, and it may
29 be only a very small short pattern.

30 Q Both Mr. Gibbs and I are

D. Longlitz
Cross-Exam by Goudge

1 perhaps pressing you unfairly beyond the extent of your
2 professional knowledge, but let me suggest to you that
3 you can agree with the general proposition, that merely
4 because there's been an apparent decline in seismic in
5 the areas you've shown us on your maps over the last
6 three years, there is no guarantee that there will not
7 be in the future an increase in seismic in that very
8 area.

9 A Yes, I guess I would have
10 to agree with that.

11 Q And some of the reasons
12 that might entice an increase in that seismic -- in
13 seismic in that area, include the development of new
14 seismic technology, the desire of different companies
15 for information on the same area, or perhaps a rise in
16 the price of hydrocarbon products, making previously
17 uneconomic areas worthy of new looks. Do you agree that
18 all three of those reasons might result in increased
19 seismic activity?

20 A Yes. There are more, too,
21 I think, than what you have mentioned there.

22 Q Would you care to add any?

23 A Well, I think that when the
24 leases and this type of thing which are issued in the
25 beginning may come up on a land sale or something like
26 this, then of course, then of course that I think is
27 when you probably run into some interesting pictures in
28 development, in buying and selling of information, and
29 various things along that line; which could then bring
30 on a flourish of seismic, yes. If the data is not

D. Longlitz
Cross-Exam by Goudge

1 available that the people want in that particular
2 area.

3 Q Again, I may preface this
4 question by saying it may stretch your professional
5 competence, and if it does please say so, but in your
6 opinion would the building of a trunk line increase
7 seismic work in the area?

8 A I really couldn't answer
9 that one.

10 Q In your evidence in chief,
11 Mr. Longlitz, you refer very briefly on page 3, to the
12 Caribou Hills Summer Seismic Program, in 1972-73, I think.
13 That was experimental in nature, I take it?

14 A I didn't quite catch that,
15 sorry.

16 Q Sorry. On page 3 of your
17 evidence, if you'll look near the bottom of the last full
18 paragraph, you talk about one summer seismic project
19 conducted in the Caribou Hills in July - August of '72.

20 A Yes.

21 Q That was an experimental
22 program, I think you said.

23 A Yes.

24 Q What were the results of
25 that summer seismic program from an environmental point
26 of view?

27 A I don't recall the exact
28 results of the program, all I know is my personal
29 experience when I was out on the site, and I briefly
30 outlined that earlier here, in that I found that on the

D. Longlitz
Cross-Exam by Goudge

1 high dry land there was not a problem, and on the lowland
2 area you got into a problem of crossing wet boggy areas,
3 and this kind of thing, which created more disturbance.
4 Those were some of the problems with the summer program,
5 although in the high and dry areas, it was almost difficult
6 at times to tell where the vehicles had travelled. So
7 it's the kind of thing that a summer program basically
8 seems to be designed around the terrain that you're
9 working in and this type of thing.

10 Q I see. Your view then
11 would be that summer seismic is permissible if carefully
12 done and on high dry ground?

13 A Yes. I think I would go
14 along with that.

15 Q Taking the delta area, is
16 it permissible on any other or --

17 A I think then, --it's getting
18 pretty tough. It depends as I say on the surface of the
19 particular site, what it's capable of supporting. If you
20 stay in a fairly low, general low area, you could find
21 a high percentage of water content, and if you get into
22 that you're going to be in trouble.

23 Q Yes. Now, in your evidence
24 in chief, you indicated that you were referring insofar
25 as offshore seismic is concerned, only to land based
26 operations.

27 A Yes.

28 Q I take it that's because
29 your particular branch of government does not deal with
30 other kinds of offshore seismic?

D. Longlitz
Cross-Exam by Goudge

1 A That's right.

2 Q And I take it the other
3 kinds are seismic from ships, basically.

4 A Yes, you have marine
5 seismic. You can have also, a program run completely
6 on the ice in the wintertime.

7 Q And that is not your
8 responsibility?

9 A No, it's not. It's not
10 a land based operation, as such, really. It's based
11 completely offshore. You might have -- the way I guess
12 maybe I could explain that this way, is that if you had
13 an operator or contractor say out on the ice, shooting
14 a program for one company who was land based, he could
15 in shooting his own program, shoot a program for somebody
16 else out on the ice; and that would not be governed by
17 the land based portion.

18 Q Who regulates that? Do you
19 know?

20 A No, offhand.

21 Q You don't know?

22 A We would -- our fellows
23 would certainly be flying over top and looking at things,
24 but really, we wouldn't have a permit system on that
25 outlying particular program, no.

26 Q Well, dealing with your
27 land use permit operation in general terms, you've told
28 us in the past that it deals with land use operations
29 on federal land north of sixty. It doesn't deal with, as
30 I understand you regulation of activity on commissioner's

D. Longlitz
Cross-Exam by Goudge

1 land.

2 A No.

3 Q That there is a separate
4 Territorial Government regulatory mechanism for that land?

5 A Yes.

6 Q I take it from what you've
7 just said that your permitting operation does not deal
8 with totally offshore developments. Is that so?

9 A Yes.

10 Q Let me ask you just for
11 my own interest, in terms of a construction operation
12 across Shallow Bay, is that something that your operation
13 would be concerned with?

14 A Construction operation --

15 Q Across Shallow Bay.

16 A I don't quite --

17 Q Well, the specific project
18 is a pipeline across Shallow Bay, would that come within
19 your jurisdiction, or is that an offshore operation?

20 A I think you're talking here
21 in terms of things that there's been no cut and dried
22 policy yet, as to how the thing's going to be handled, so
23 I could not even comment really, on that.

24 Q Man-made islands fall within
25 your jurisdiction?

26 A Yes, usually they're
27 supported by land based.

28 Q I take it though that your
29 operation does regulate all activities on land; obviously
30 things like drilling activities on land are regulated not

D. Longlitz
Cross-Exam by Goudge

1 by the land use operation, but by another facet of the
2 Department of Indian Affairs.

3 A Both.

4 Q Both. I see. What about
5 water based activities on land, if I can put it that way.
6 Inland water activities, from boats? Is that something
7 that's of concern?

8 A Usually, if you've got an
9 inland activity, it must have a base onshore --

10 Q And provided it's based on
11 land, it's a land base, it comes under your jurisdiction?

12 A Yes, and there are ^{other} regulations
13 in that which also apply as well.

14 Q Right, I understand that.

15 Now, as part of your land
16 use regulation operation, I take it it's been incumbent
17 on you and your people to engage in regulation on a year
18 to year basis, with companies involved in continuing
19 activity , in the valley and in the delta. Is that so?

20 A Yes.

21 Q And I take it that involves
22 a year to year inspection process of activities of the
23 same company in some cases?

24 A It's not necessarily a
25 year to year thing, the permit system allows for a permit
26 issued for two years, with an extension of one year.
27 The inspection and enforcement team does not necessarily
28 just base it on a year, they will follow the program right
29 along. They don't necessarily --

30 Q They follow the same program

D. Longlitz
Cross-Exam by Goudge

1 from beginning to end.

2 A Right, and it's a basis of
3 you know, how often and what the activity is, and when
4 you're going to go out and inspect it, and this type of
5 thing. It's, you know, and what you expect to find, and
6 this type of thing.

7 Q Well, let me explain to you
8 the problem I'm interested in, and I realize that you're
9 here obviously only in your personal capacity, and giving
10 us your best professional opinions as an individual. Is
11 there a problem when you have inspection of an ongoing
12 project, that takes some time, perhaps two years, with
13 the inspectors of the project becoming too closely
14 involved with, or acquainted with, the people they're
15 regulating. Is that a problem area?

16 A We try to use a -- what
17 you'd call a rotation program where you don't -- you
18 can put two different inspectors. One might do it one
19 time, the next time the next fellow will come along and
20 do it. That way you get uniformity of application, and
21 get into a rotational basis, which gets away from that
22 very thing you were --

23 Q I see. So you ensure an
24 objective and arms length relationship by using rotation
25 of your inspectors?

26 A Yes. We work at that, as
27 I say, it depends on staff turnover, holidays, various
28 things along this line, which will interfere with that
29 of course, but as a general rule, yes, that's what we
30 try and do.

D. Longlitz
Cross-Exam by Goudge

1 Q I see. You as well referred
2 in answer to Mr. Evans, to the research function, or the
3 monitoring function perhaps that may be available to you,
4 and let me ask you in general terms whether the inspection
5 operation that you're familiar with requires a research
6 backup to assist it.

7 A How do you -- which way do
8 you mean that?

9 Q Well, let me suggest this
10 to you, that it is desirable that the inspection function
11 that you're involved in, have behind it the research and
12 monitoring capability so that monitoring can go on for
13 those activities which are being regulated.

14 A Yes, I think that in a sense
15 is built into the system in that the reports that ^{are} filed
16 by the Inspectors do end up right through to our head
17 office, and on the basis of that then they may be further
18 evaluated, and requirements come out of them.

19 Q And the evaluation is done
20 by what I might call the research and monitoring group?

21 A Right.

22 Q I take it sir that you'd
23 therefore be in favour of a coincidental increasing in
24 the research function, when an increase is required in the
25 size of the inspection operation. In other words, if you
26 get development that requires an increase in the forces
27 used for inspection, you as well need an increase in the
28 forces available for research ?

29 A Yes.

30 MR. GOUDGE: - Thank you. Those

D. Longlitz

Cross-Exam by Goudge

1 are all the questions I have.

2 THE COMMISSIONER: Re-examination?

3 MR. BAYLY: I have no
4 re-examination, Mr. Commissioner.

5 THE COMMISSIONER: Well, thank
6 you, Mr. Longlitz. I certainly appreciate your coming,
7 and I, and all connected with the Inquiry, want to thank
8 you for preparing these maps and slides which offer us
9 a comprehensive picture of seismic exploration in the
10 area. We really found that a graphic and most helpful
11 way of learning what has gone on, and I hope that we do
12 see you again as a witness, and I take it it will be at
13 Yellowknife, later in the spring. At any rate, thank
14 you very much.

15 WITNESS LONGLITZ: Thank you.

16 (WITNESS ASIDE)

17 MR. GOUDGE: Six; it's twelve
18 fifteen, I wonder if we might now break for lunch, rather
19 than embark upon the reading in chief of the next panel.

20 THE COMMISSIONER: All right.

21 MR. GOUDGE: It would have to
22 be interrupted in any event.

23 THE COMMISSIONER: Let's
24 adjourn then until one thirty?

25 MR. BAYLY: Yes, I was going to
26 suggest that Mr. Commissioner, because if possible I'd
27 like to complete --

28 THE COMMISSIONER: Excuse me,
29 order please, I want to hear Mr. Bayly.

30 MR. BAYLY: -- I'd like to

1 complete the evidence of Mr. Monaghan, if we could, as
2 he has meetings tomorrow and the next day in Yellowknife
3 and Fort Smith, and if we did start at one thirty, that
4 might be possible.

5 THE COMMISSIONER: All right;
6 and counsel might consider whether they would wish to sit
7 tonight, if that would enable us to move along. We have
8 a community hearing tomorrow night, but we could sit
9 Thursday night as well. At any rate, you people might
10 discuss that, and see how -- see if a consensus develops.
11 We'll adjourn till one thirty.

12 (PROCEEDINGS ADJOURNED AT 12:15)
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H. Monaghan
In Chief

(PROCEEDINGS RESUMED AT 1:45 P.M.)

HUGH MONAGHAN, sworn

MR. BAYLY: Mr. Commissioner,

before we begin with Mr. Monaghan, I have listed earlier, about a week ago, a report by Messrs. Simmons and Barry, entitled "Oil Exploration and the Banks Landers", a report of the Canadian Wildlife Service, 1973, and I have here as well, a report of the Northwest Territories Game Management Division of the Government of the Northwest Territories and it's called "The Effects of Oil Exploration Activities on the Caribou, Muskox and Arctic Foxes on Banks Island", and it's designated as appendix two to the report earlier referred to; and if anybody wants to see that, we have a copy of it. It's dated October, 1970 -- November, 1971 but that doesn't reflect when we got it.

DIRECT EXAMINATION BY MR. BAYLY:

Q Mr. Monaghan, before we begin with your evidence, I understand that you adopt and rely on the statement that was read into the evidence by Mr. Longlitz when he first appeared as regards to Government employees and the giving of their evidence?

A That is correct, sir.

Q Could we turn to your curriculum vitae and would you go over that for the Inquiry? Mr. Monaghan has been sworn, sir.

A I received my elementary and high school in Saskatchewan and graduated in 1963, received a Bachelor of Science Degree, majoring in Zoology from the University of Alberta, graduation in 1968. As

H. Monaghan
In Chief

1 to relevant experience, I began in 1965 as a technical
2 assistant at the University of Alberta, then began work
3 in 1966 - 1968 as an Area Game Management Officer, Fort
4 Simpson. September, 1968 to August, 1969, as Regional
5 Game Management Officer, Fort Smith -- August 1969 to
6 June, 1974, Supervisor, Big Game Management -- June, 1968,
7 sorry, June, 1974 to present, Environmental Coordinator.

8 With the exception of the summer
9 employment in 1965, all of these positions have been
10 with the N.W.T. Game Management Division which was
11 transferred from the Federal to the Territorial Government
12 in 1968 and became the Fish and Wildlife Service in 1975.

13 Within the latter role as
14 Environmental Coordinator, I represent the Fish and
15 Wildlife Service on the N.W.T. Land Use Advisory Committee,
16 and Technical Committee of the N.W.T. Water Board, the
17 Arctic Waters Oil and Gas Advisory Committee.

18 I should perhaps mention that
19 my representation in the Land Use Advisory Committee was
20 prior to assuming my current responsibilities and actually
21 started with it when it was formed in 1971.

22 Professional affiliations --
23 a member of the Wildlife Society, and a member of Panels
24 nine and ten of the Canadian Committee for the Inter-
25 national Biological Program.

26 Q Mr. Monaghan, I wonder
27 if we could turn to the first page of your evidence and
28 if you could present that evidence to the Inquiry, please.

29 A Yes, sir. In this resume
30 of the impact of seismic exploration on wildlife, I will

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1 review the data that are currently available on the sub-
2 ject, outline what data are required to regulate the
3 activity to protect wildlife and indicate the manage-
4 ment procedures that can be recommended at this time.
5 These comments are restricted to terrestrial mammals,
6 including some of the aquatic fur bearers, as I am
7 concerned primarily with those species.

8 The direct impact of seismic
9 exploration on wildlife is managed by the Department of
10 Indian and Northern Affairs by the Land Use Regulations.
11 The Land Use Advisory Committee provides recommendations
12 to the Chairman who has the authority to issue the permit
13 authorizing the program.

14
15
16 The Fish and Wildlife
17 Service has a mandate to manage only indirect impact of
18 industrial activities. Any direct impact that occurs
19 as a result of the various components of the seismic pro-
20 gram, which may include the following:

- 21 Aerial reconnaissance of the proposed program.
- 22 Movement of the equipment and camp into place.
- 23 Surveying of seismic lines.
- 24 Clearing of the cutline (that is, if in the treeline).
- 25 Drilling the shot holes along the seismic lines.
- 26 "Shooting", that is blasting and recording.
- 27 Vehicular traffic by the various crews, that is
- 28 surveyors, drillers, etc.)
- 29 Air and/or ground support to the seismic party pro-
- 30 viding their resupply and crew changes.

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Now, sir, to look at what is currently known about the impact of seismic exploration on wildlife. In reviewing the literature pertaining to fur bearers, it quickly becomes apparent that there is very little directly related data available. Urquhart, 1971, 1973, of the N.W.T. Fish and Wildlife Service, carried out a study of the impact of oil exploration on Banks Island between 1970-1972. Based on limited observations of disturbance during capture attempts of fox dens and similar experiences by Speller, Urquhart felt that,

"When natural food is abundant, denning foxes can withstand the high level of temporary harassment at the den site".

There is, however, no quantitative data on which to base this statement.

In an attempt to determine the degree of association of foxes with seismic camps, Urquhart collected resighting data on marked foxes. He noted that the camps would hold the foxes in the vicinity, temporarily, and stated,

" the effects on the population, so far, appears to be negligible".

at least in years of high fox population.

I am not aware of any data in the literature which permits an evaluation of the impact of seismic exploration on other carnivorous fur bearers.

The possibility of direct disturbance to semi-aquatic species of mammals, in particular, does exist as a result of blasting. This concern has been raised repeatedly by the residents of the

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1 indicated the degree of disturbance that will be tolera-
2 ted by grizzly bear or polar bear in the vicinity of
3 their dens, that could be used to adequately mitigate
4 against potential disturbance of seismic programs.

5 In addition, at this time,
6 there are currently no effective deterrents to avoid
7 bear - man conflict other than man avoiding areas fre-
8 quented by bears.

9 To comment on the data available
10 relevant to the impact of seismic exploration unuglates,
11 it is necessary to review the various forms of disturbance
12 that could occur as a result of each of the activities
13 associated with the program. These are, the cost to the
14 animal of reaction to presence of seismic lines and
15 access trails, and potential disturbance resulting from
16 vehicular traffic, air traffic and noise associated with
17 blasting.

18 Urquhart provides some relevant
19 information on caribou from the study on Banks Island.
20 These caribou are considered to be an integrated species
21 between barren ground and Peary caribou. He made ob-
22 servations of the reaction of the caribou to seismic
23 related activities during the fall of 1970. It should
24 be noted that there was no provision made for the use
25 of exploration equipment in experimental situations.
26 Rather, the observations resulted from chance encounters
27 between caribou, the equipment, camps and seismic lines.

28 His observations indicated there
29 was a limited reaction to the presence of the camp.
30 Caribou seldom approached within two miles of camps located

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1 in open areas during the day. However, they did approach
2 closer during the night. In hilly areas, they appeared
3 nearer the camps, probably due to hills -- probably
4 because the hills masked sounds and smells. McCourt
5 et al, noted only a very local avoidance of an inactive
6 camp on the mainland. Caribou passed within 200 yards.

7 Urquhart also noted variable
8 but limited response by cari -- I'm sorry, caribou to
9 the approach of seismic equipment.

10 "Reactions varied from running off at the sound of
11 the vehicles to passively watching the vehicles
12 pass within one half mile or less".

13 Urquhart's observations however,
14 were made primarily during the rut when response to
15 disturbance may differ considerably from other seasons.

16 Slaney, 1975 commented on the
17 reaction of Peary caribou to vehicles and blasting
18 associated with the program on Bathurst Island. However,
19 the data was limited and inconclusive.

20 Urquhart indicated that the
21 reaction of caribou on Banks Island to seismic lines
22 was dependent to the degree to which the line was drift-
23 ed with snow, thereby eliminating the raised edge of
24 the line. He concluded that

25 "Seismic lines exert local influence on caribou
26 distribution for some time after they (the seismic
27 lines) had been used."

28 Though he indicated that it was unlikely that the lines would
29 significantly interfere with migration. This was based
30 on a "reconnaissance grid" seismic program which is less

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1 intensive than detailed programs associated with delineating a geological formation.

3 Main access roads were found to
4 have a more profound impact on caribou movements. He
5 noted that caribou did not actively use the seismic
6 lines or access roads. Slaney, on Bathurst Island,
7 where the surrounding snow covers were sufficiently
8 hard as to bear the weight of a caribou, did not note
9 any preference for using or not using lines. The data
10 may have been insufficient for any real comparison.

11 The reaction of caribou to the
12 presence of cutlines in the treeline would appear to be
13 variable. McCourt, et al, noted that during the mid-
14 winter disturbance, caribou used seismic lines where
15 there had been vehicular traffic, probably due to shallower snow and relative ease of movement. But physically,
16 this is obviously a different situation than that in
17 tundra regions.

19 During spring migration, the
20 animals were, as a rule, reflected along cutlines for
21 fairly short distances when the angle of their movement was at 15 degrees or less variance with the direction
22 of the cutline. The net effect, in terms of energy
23 cost, of a single or series of such deflections was not
24 provided, but this has since been commented on by Geist,
25 1975. I believe that evidence has been tabled before this
26 Inquiry.

28 THE COMMISSIONER: I think it
29 has, hasn't it Mr. Goudge?

30 MR. GOUDGE: The report is tabled

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1 as an exhibit, sir, yes.

2 A The amount of aircraft
3 traffic associated with an individual seismic program
4 could be termed as occassional. The response of caribou
5 to fixed wing aircraft and helicopters has been noted
6 by a number researchers: McCourt, et al, Calef, et al.
7 The data has usually been collected in the form of
8 incidental observations using several categories of
9 gross observable response as a criteria.

10 McCourt, et al, concluded that
11 caribou reacted more strongly to a Bell 206 helicopter
12 than a Cessna 185 at less than 300 feet, but that there
13 was no difference above that altitude and that the reaction
14 to aircraft flights above a thousand feet, was unpredict-
15 able but infrequent.

16 They concluded that a relation-
17 ship existed between group size and reaction to flights
18 below 300 feet, with the larger groups reacting most
19 intensively -- intensely. They suggested there appeared
20 to be a difference seasonally, but indicated their data
21 was incomplete. They suggested minimum flight elevations
22 be set at a thousand feet. However, Geist, in reviewing
23 this and other data, recommended 1500 feet.

24 Calef, et al, observed a "panic"
25 reaction by less than 20 percent of the groups in re-
26 sponse to an overflight below 200 feet, but no such
27 reaction or strong escape responses as a result of air-
28 craft flying at an elevation below 500 feet. At the
29 latter elevation, they note --

30 MR. BAYLY: Is that below or

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1 above?

2 THE COMMISSIONER: I think
3 above makes sense.

4 MR. BAYLY: You said "below"
5 and I just wondered whether you meant above as is written
6 there.

7 A It is supposed to be "above",
8 sorry. They^{did} note a different trend in behavior when
9 the caribou were on the calving grounds and during cold
10 weather. In both instances, the relative occurrence
11 of panic and strong escape responses was greater at all
12 altitudes up to 500 feet. They found that reaction to
13 helicopters at below 500 feet was less than that of fixed
14 wing aircraft which differs from other observers (McCourt,
15 et al, Klein). They stated that the terrain type and
16 vegetation type did not appear to affect the reaction of
17 caribou to the disturbance, but that there was a relation-
18 ship to the activity of the caribou.

19 Differing from McCourt's data,
20 resting animals were more -- I'm sorry -- were less
21 reactive.

22 Thus, the data available to
23 date in various forms of disturbance to caribou that
24 could be associated with seismic programs is not com-
25 pletely in agreement and is based on only immediate and
26 gross observable response.

27 In his studies of the impact
28 of oil exploration on muskox, Urquhart indicated that
29 the base -- that based on limited observations, muskox
30 herds may abandon areas occupied by seismic exploration

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1 equipment. This raises the concern that muskox could
2 be displaced to less ^{desirable} habitat. This would be particularly
3 important during late winter and early spring, when they
4 can least afford it, due to being in a situation of
5 negative energy balance, (Hubert, 1974).

6 Observations by Urquhart, Slaney
7 and Beak, 1975, would indicate they observe no pro-
8 nounced response by muskox to the seismic operation,
9 presence of camps and aircraft support flights. Gray,
10 1972, in discussing disturbance, states:

11 "Buzzing or circling by helicopters and fixed wing
12 aircraft seems to be the most harmful of man's
13 activities".

14 Further, that:

15 "This type of disturbance must be of -- "

16 I'm sorry,

17 "This type of disturbance must have deleterious
18 effect on the weaker animals in the herd; old bulls,
19 pregnant cows, and those in poor condition."

20 Urquhart indicated that the effect of aircraft disturbance
21 depends on the season and topography and that individuals
22 may be injured and calves abandoned if aerial harassment
23 occurs in April and May. Again, the data is largely
24 -- the data is based largely on immediate and observable
25 response, providing no quantitative data on which to
26 base specific recommendations with any degree of accuracy
27 or certainty. A minimum flight elevation of 1500 feet
28 above ground was suggested.

29 I am not aware of any studies
30 that specifically address the question of behavioral re-

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1 sponse of moose to seismic exploration. Geist, in his
2 reference to the anticipated effect of gas lines stated

3 "In the case of moose, a good argument can be made
4 that firstly, relatively few animals will be affect-
5 ed and, secondly, and most importantly, the biology
6 of moose is such that the population will soon re-
7 cover from ill effects after a particular agent of
8 harrassment ceases to exist."

9 Although seismic activity
10 encompasses a broader area, the duration of the activity
11 is likely to be less intense and shorter in duration,
12 if we assume the program progresses at the normal rate.
13 In general, the natural plant succession associated with
14 regrowth on the cutlines, usually constitutes habitat
15 improvement for moose.

16 Extensive seismic programs
17 have not been carried out, nor are they likely to occur
18 to a great extent in areas critical to the survival of
19 Dall sheep, (i.e.: lambing areas and winter range.)
20 However, aircraft disturbance associated with the support
21 of seismic programs could occur to a limited degree.
22 Data on the tolerance of sheep under varying conditions
23 are limited and not adequate to provide precise guidelines
24 for overflights of different types of aircraft. (Simmons,
25 personal communications; Prescott, personal communications)

26 Now, sir, to look at what we
27 need to know about the impact of seismic related
28 activities. To adequately evaluate the impact of seismic
29 exploration on Arctic fox, to date, or adequately mitigate
30 it -- mitigate against it in the future, it would be

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necessary to determine the level -- sorry,

Number one. The level and effect of disturbance associated with the presence of a seismic camp, aircraft flights and vehicular traffic on natural activities of fox in the vicinity of den sites during the breeding season and during the period in which young are reared.

8 Number two. If any physical
9 alteration of den sites occurring as a result of traffic
10 by surface vehicles, should it be demonstrated that
11 physical -- the physical integrity of dens is important
12 to the production and survival of the young. In addition,
13 it is necessary to determine all areas where there are
14 relatively high densities of den sites where seismic
15 has or is likely to occur.

16 If one above, is density
17 dependent, then it would be necessary to be aware of
18 the relative abundance of fox and prey species. To
19 evaluate --

20 Q Before you go any further,
21 I wonder if you could define that term "density depend-
22 ence" for the Commission, just in general terms so we'll
23 know what that --

24 A Well, what we're getting
25 at there is the impact may vary depending on the
26 population status of fox. If it's density dependent,
27 there may be a different reaction or response under high
28 density conditions versus, a condition of low density
29 or relative abundance, I guess is a better word.

THE COMMISSIONER: And the impact

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1 would depend on the density of the foxes or is "density
2 dependent" a term of art that we don't understand.

3 A It would have to be deter-
4 mined if the effect to foxes was different under
5 different conditions of relative abundance.

6 THE COMMISSIONER: I see, yes.

7 A To evaluate impact on
8 other carnivores -- I'm sorry -- To evaluate the impact
9 on other carnivorous fur bearers, similar information
10 would be required, but in consideration of the biology
11 of the various species, it would likely be a less pro-
12 ductive exercise. The impact on habitat within the
13 treeline has been more considerable but perhaps it is
14 not of great significance in terms of habitat available
15 to the species population.

16 In certain instances, the habitat
17 alteration may be beneficial. To fully understand the
18 direct impact on muskrats of blasting associated with
19 conventional seismic programs further research is re-
20 quired to document any changes in reproductive success
21 that may result. This research is now being initiated.

22 Experiments of a similar nature
23 are required in cooperation with operators using uncon-
24 ventional techniques, such as multiplicity seismic which
25 may involve a higher degree of activity in a limited
26 area.

27 To determine the impact of seis-
28 mic programs on large carnivores, black, grizzly and
29 polar bears, we must first determine the effect of relat-
30 ed activities on the denning behavior of bears. It would

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then also be necessary to know the location of den sites or at least areas where dens occur frequently in the vicinity of activity.

Conflicts between bear and man in the vicinity of camps has been minimal to date, primarily because of the operating season and the fact that the seismic programs have been largely on land. Research is required to develop deterrents that are adequate to keep bears away from camps and conflicts resulting from polar bear entering camps will likely increase without such deterrents, as the amount of offshore seismic increases. A similar situation will result in the greater number of camps -- I'm sorry, -- A similar situation will result if a greater number of camps are occupied in the summer months for maintenance purposes in polar bear summer sanctuaries or in areas inhabited by grizzly and black bear. This research, I understand is currently in the planning process.

To evaluate the impact of aircraft harassment on bears, quantitative data on the net effect of disturbance is required under varying conditions. However, the amount of aircraft traffic associated with most programs is limited and not of the type, that is low level, that would normally cause great disturbance to bears.

To determine the impact on caribou on the mainland and in the Arctic islands, it is necessary to know the net effect of disturbance caused by all facets of the operation under varying conditions and the total of all such disturbances annually

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1 and over a period of years.

2 The data provides some informa-
3 tion on the observable response, but no attempt has been
4 made to measure quantitatively the net effect of this
5 on individual caribou or herds. It is noteworthy that
6 Urquhart, in relation to his own research in Banks
7 Island concluded:

8 "None of the studies have been able to supply in-
9 formation on the long term effects of oil explora-
10 tion on caribou".

11 And further, he indicated that:

12 "Studies on the behavior of caribou in relation to
13 exploration operations should be undertaken.

14 Emphasis in such studies should be given to the
15 influence on social behavior and in causing
16 physiological stress."

17 In Geist's critique of the
18 research carried out by McCourt, et al, on the response
19 of caribou to the cutlines he states:

20 "The applicant has failed to provide adequate in-
21 formation on which to assess the effects of seismic
22 lines on caribou migrations."

23 Geist also indicates that the
24 criteria that should be used for collecting data on air-
25 craft harassment should be:

26 "In terms of physiology, reproduction, mortality
27 and bioenergetics".

28 Geist refers to the need to extend such research to be
29 carried out in such a manner as to permit the creation
30 of a predictive model on the effects of planned seismic

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1 lines on the caribou migration; the delays recurred
2 and the data on cost of locomotion on and off the lines.

3 To provide completely adequate
4 management recommendations relevant to seismic operations,
5 the model suggested by Geist would have to be extended
6 to include other forms of short term disturbance associa-
7 ted with an active program. This would include the
8 effect of disturbance resulting from blasting, varying
9 degrees of air and surface vehicular traffic and the
10 presence of active camps. To evaluate impact, it would
11 be necessary to combine this with data on the population
12 status of the herds and other limiting environmental
13 factors that may exist. The latter is particularly
14 valid in the Arctic islands where apparently natural
15 population fluctuations occur due to such factors as
16 snow cover. (Miller and Russell, 1974)

17 A less complex model, however,
18 could mitigate against most significant forms of dis-
19 turbance.

20 Many of the above comments
21 relevant to the type of information required to manage
22 impact on caribou apply as well to muskoxen. An obvious
23 exception is that there is evidence which indicates
24 negligible impact of new or old seismic lines on local
25 movements of the species. It is necessary to determine
26 quantitatively the energy expenditure resulting from
27 varying forms and degrees of disturbance. This must be
28 combined with available data on the range requirements
29 of muskox to predict the impact of a single operation or
30 a series of seismic operations in a given area. Of

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1 particular importance is the matter of displacement
2 even if local, to less desirable habitat during the
3 late winter and early spring.

4 Now sir, to look at our ability
5 to recommend adequate procedures at this time. It is
6 evident that at this time it is possible only to recommend
7 operating procedures to minimize impact.

8 In relation to Arctic fox,
9 the locations of most major denning areas are not known
10 nor is the effect of potential disturbance at the den
11 sites. Although under most conditions it is probably
12 localized and not longterm in nature. Thus, current
13 management procedures may be adequate but this is not
14 certain. In relation to muskrats, the management pro-
15 cedures currently used in the delta for conventional pro-
16 grams of not permitting blasting within twenty feet of
17 lakes would appear to be adequate to prevent direct
18 mortality or gross physical damage to muskrats.

19 However, this does require
20 verification as does the potential impact on subsequent
21 reproductive success.

22 At this time, it is only
23 possible to provide management recommendations to minimize
24 impact on bear. This can be accomplished primarily
25 through the avoidance of a few den sites that are known,
26 and garbage incineration in an attempt to limit bear-man
27 conflict in camps.

28 In most cases, the data on
29 denning sites is inadequate. In addition, there is not
30 adequate information to properly manage disturbance in

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1 the vicinity of dens nor adequate deterrents to eliminate
2 bear - man conflict at camps at this time. Other
3 measures in support of this, such as the limitation of one
4 fire-arm per camp and control of the supervisory personnel,
5 are also meant to limit the destruction of bears or
6 other wildlife -- I'm sorry -- are also meant to limit
7 the destruction of bears or other wildlife. The
8 establishment of a minimum flight elevation at 1500 feet
9 above ground level in an anti-harassment clause are
10 also meant to minimize disturbance, but these are largely
11 unenforceable.

12 The amount of information on
13 seasonal movements and population estimates of caribou
14 in the mainland and Arctic islands has increased
15 dramatically in recent years. As a result, it is
16 possible, in some cases, to provide recommendations to
17 minimize disturbance in critical, this is wintering and
18 calving areas and along spring migration routes. However,
19 according to Geist, the evaluation of impact is subject-
20 ive, being based on observable response rather than a
21 clear understanding of the actual stress that may be
22 inflicted on the animals. Thus, using his criteria,
23 it is only possible to provide recommendations at this
24 time to limit gross observable indicators of stress
25 in those areas where we have adequate knowledge of
26 population movements and distribution.

27 The short and long term impact
28 on caribou of seismic activity would appear to be unclear.
29 This is particularly apparent in boreal forest where
30 cutlines exist for a considerable length of time as will

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1 the reaction to them and the resultant
2 energy cost to females returning to the calving grounds.

3 The amount of data on muskox
4 numbers and distribution has also increased vastly since
5 1970, particularly in the Arctic islands. It is possible
6 to provide recommendations to reduce the interaction of
7 seismic programs in areas of relatively high muskox
8 density and during critical periods. This is usually
9 accomplished by rescheduling work in specific areas
10 and in some cases, recommending that operations cease
11 early to avoid stressing muskoxen during late winter
12 and early spring. Thus, as data are inadequate to pro-
13 vide clear and accurate guidelines, conservative recom-
14 mendations are often provided.

15 As impact cannot often be
16 predicted, it cannot also be evaluated after the fact.
17 Monitoring of impact to check the adequacy of operating
18 conditions is not possible. To understand the actual
19 impact of seismic and to distinguish between short and
20 long term impact, all factors (abiotic and biotic) must
21 be understood and documented for specific populations.
22 For example, the people of Resolute Bay have associated
23 the decline of the caribou population on Bathurst Island
24 with industrial activity. However, periodic population
25 crashes are a well known fact of life in the Arctic.
26 The decline of muskox and the caribou on Bathurst Island
27 in 1973 and 1974 was attributed to excess snow cover
28 (Miller and Russell, 1974) A die-off was recorded on
29 Bathurst Island in the winter of 1967-68 prior to seismic
30 activity on the island. In the former instance, Miller

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1 and Russell state:

2 "There was no evidence on which to evaluate the
3 effects of industrial exploratory activity on either
4 species."

5 Thus, although the evidence
6 appeared to indicate the problem was climatic, it could
7 not be isolated as being purely that. Disturbance
8 resulting from seismic and other exploratory operations
9 could compound the situation for animals that may already
10 be in a position of serious negative energy balance.

11 In summary then, specific data
12 gaps have been identified as existing in relation to
13 establishing the management procedures for all species.
14 However, this does not mean that all seismic programs
15 cannot be adequately regulated at this time to avoid
16 significant and long term impact on the species. In
17 relation to muskrats in the delta, controls in blasting
18 would appear to at least minimize mortality even in
19 the areas directly affected.

20 Although the impact of activity
21 in the vicinity of Arctic fox dens is not understood,
22 where concentrations of dens are identified, they can
23 be avoided in the spring. In any event, it is unlikely
24 that a high proportion of the dens would be in direct
25 contact with seismic operations given the current
26 intensity of seismic programs. In consideration of the
27 biology of the fox, it is unlikely to have great long
28 term negative impact to date on this species which
29 exhibits radical fluctuations in population under normal
30 conditions.

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The effect of direct disturbance to the behavior of other fur bearers to date is also unlikely to cause long term impact. It would also appear unlikely that large scale habitat alteration has occurred. However, by reviewing and approving individual applications, the Land Use Committee does not have an adequate mechanism to consider the cumulative effects of a number of programs. If seismic activity intensifies in the Mackenzie Delta, for instance, serious alterations could occur.

Similarly, there is potential for long term major impact to caribou that winter in the boreal forest. Current recommendations attempt to minimize disturbance to caribou, but the long term effects of an increasing number of seismic lines is not understood in relation to winter range of the Porcupine and Bluenose herds.

Disturbance to muskox can be managed to avoid obvious problems, but an evaluation of the adequacy of these measures is not possible at this time. As with caribou, the loss of a significant portion of cohorts due to the poor reproductive success within a herd could lead to long term impact.

Seismic camps can be managed to minimize conflict with bears, however, an adequate deterrent is required to eliminate this problem, as is research to provide guidelines for managing activity in the vicinity of dens -- den sites.

To adequately manage all disturbance to wildlife resulting from seismic exploration,

H. Monaghan
Cross-Exam by Evans

1 the Land Use Advisory Committee requires the authority
2 to initiate research to provide comprehensive operating
3 conditions for industry. This would include considera-
4 tion of the cumulative effects of all programs, seismic
5 and otherwise that could have impact on a wildlife
6 population.

7 MR. BAYLY: Mr. Monaghan is
8 now available for cross-examination, Mr. Commissioner.

9 MR. EVANS: O.K., Mr. Commissioner,
10 er, I believe I'm the first to question Mr. Monaghan.

11
12 CROSS-EXAMINATION BY MR. EVANS:

13 Q Now I think you stated
14 that you'd been a member of the Land Use Advisory
15 Committee since 1971 when it was formed is that correct?

16 A That is correct.

17 Q And you're still a member
18 are you?

19 A I'm on a temporary leave
20 of absence, but will be, now, as a matter of fact, this
21 week, getting back in the Land Use, so, I guess, effec-
22 tively I've been on a continuous basis with this Committee
23 since 1971.

24 Q Well, you said you were on
25 a leave of absence, how long was that?

26 A I wasn't involved directly
27 in the Land Use Committee between November 1, just passed,
28 until this week.

29 Q Oh, I see, just a short
30 period, O.K.

H. Monaghan
Cross-Exam by Evans

1 A That is correct.

2 Q Yes. Well, during that
3 time, has there been any cooperation between the
4 Canadian Wildlife Service or the Territorial Game Branch
5 to develop research programs which would provide data
6 for the Committee?

7 A As an individual, I've
8 had quite close cooperation with the C.W.S. personally,
9 yes.

10 Q Well, I guess I was in-
11 terested in the cooperation between the Committee and
12 the C.W.S. and the Territorial Game Branch. Could you
13 say something about that?

14 A Fish and Wildlife Service
15 and the Canadian Wildlife Service have had a close work-
16 ing relationship for a number of years. The Canadian
17 Wildlife Service is also on the Committee.

18 Q With respect to specific
19 research programs.

20 A Yes, the two studies
21 referred to here -- the one carried out on Banks Island
22 in relation to -- well Urquhart's research, and, as well,
23 the research carried out in the Mackenzie Delta on the
24 effects of seismic blasting have both had close coopera-
25 tion with the C.W.S.

26 Q How were these studies
27 funded?

28 A The Banks Island study,
29 I believe, was joint funding between the C.W.S. and the
30 N.W.T. Fish and Wildlife. The Rat study, I believe

H. Monaghan
Cross-Exam by Evans

1 was carried out by Fish and Wildlife with Fish and
2 Wildlife funding with technical support from C.W.S.

3 Q Are there other examples
4 of cooperation between the agencies on matters related
5 to wildlife research?

6 A Yes.

7 Q -- to meet the needs of
8 the Land Use Committee.

9 A Those were two studies
10 that were directed specifically towards questions
11 raised by Land Use. We've had close cooperation with
12 C.W.S. in other studies but they weren't specifically
13 pointed at answering questions related to Land Use.

14 Q To your knowledge, has
15 there been, during this period, close cooperation between
16 the Land Use Committee and the ALUR program, specifically
17 on research that would be relevant to the impact of seis-
18 mic programs on wildlife?

19 A I believe recommendations
20 have been made to the Land Use Committee, relevant to
21 research that should be carried out, by ALUR or other
22 groups. I don't think there's been a direct
23 association between ALUR and Land Use Advisory Committee,
24 at least on a formal basis.

25 Q So any cooperation has been
26 informal, in other words?

27 A I'm not sure. In relation
28 to -- I have had both -- personally, I have had both
29 formal and informal contact with ALUR.

30 Q Won't the Land Use Assess-

Mr. Monaghan
Cross-Exam by Evans

1 ment make specific proposals to ALUR on research that
2 could be undertaken?

3 A There have been suggestions
4 made to ALUR, yes.

5 Q Well what kind of --
6 what kind of suggestions?

7 A The Rat study which is
8 currently being instigated now in the delta on the
9 effects of seismic blasting has been made to ALUR and,
10 I think it is supported now by ALUR. I think they're
11 the group providing the funding. I'm unsure as to
12 whether it's ALUR or whether it's the Indian Affairs
13 Administration. I think you'd have to check with them
14 on that.

15 Q So that was undertaken
16 on your recommendation -- on the Committee's recommenda-
17 tion?

18 A I believe that's correct.

19 Q Were there any other pro-
20 grams?

21 A I'm not aware of any others.

22 Q Did you make recommendations
23 that weren't accepted?

24 A I'd prefer not to comment
25 on that.

26 Q You don't wish, I see, O.K.
27 If you feel that's an area you don't want to comment on,
28 that's fine. Mr. Monaghan, on page four of your pre-
29 pared testimony, I've got two sets of your testimony
30 and my references aren't the original one but I think

H. Moraghan
Cross-Exam by Evans

1 they're mostly the same. You mentioned a destruction of
2 pushups by machinery. Do you know how extensive this
3 destruction is?

4 A No, I do not.

5 Q Maybe you could explain
6 to me what a pushup is.

7 A Well, a good percentage
8 of the rats in the Mackenzie Delta are bank rats, their
9 winter home is -- I guess you'd say is in a bank. Well,
10 they create what we call pushups during freeze up. They
11 chew up through the ice and pile up vegetated material.
12 This represents a food source to them and also breathing
13 holes for movement around the slough under the ice.

14 Q Now, if a company were
15 harvesting snow from a lake to build a snow road, would
16 this result in the destruction of pushups?

17 A It would if they didn't
18 avoid the pushups.

19 Q Well, in areas where there
20 are muskrats, would it possible for them to avoid, or
21 would the pushups be sort of all over the lake or in one
22 particular part?

23 A Early in the season, particularly
24 when the snow is shallow, you can identify pushups
25 very easily. They're very observable, or very obvious.
26 You could go around them if you were aware that they were
27 there and you knew what you were looking for.

28 Q So you might recommend then,
29 that companies who were building snow roads avoid pushups?

30 A That is correct. I'm sorry,

H. Monaghan
Cross-Exam by Evans

1 you said I would recommend.

2 Q Yes.

3 A That is correct.

4 Q And you think, I believe
5 you think that's possible.

6 A It is at least early in
7 the winter; a bit later on, depending on snow depth,
8 the pushups may not be observable -- some of the pushups.

9 Q So there's a potential then
10 for destruction of muskrats if you harvest snow from a
11 lake in which there's pushups.

12 A There's a potential for
13 destruction of pushups.

14 Q Well, would that result
15 in destruction of muskrats if you destroyed their pushup?

16 A There may be a number of
17 pushups associated with one active den of muskrats. The
18 net effect of eliminating one pushup, I'm not sure of.
19 But obviously, it wouldn't be beneficial to the rats.

20 Q How about if you got them
21 all?

22 A I would assume it would be
23 pretty hard on the rat population.

24 Q That would be pretty well
25 it for those rats?

26 A I would assume that.

27 Q Yes. How about if you
28 took snow only from one end of a lake and the muskrats
29 were confined to the -- to another, you know, to a portion
30 of the lake, would that have a detrimental effect on them?

H. Monaghan
Cross-Exam by Evans

1 A I'm sorry, what you're
2 saying is, the pushups on one half the lake would be
3 eliminated and the other half wouldn't be?

4 Q Maybe I'm leading you
5 down the path here. I thought from what you said that
6 you thought that you could avoid -- the one method
7 of dealing with this would be to harvest snow from only
8 part of the lake and possibly destroy some of the pushups
9 but leave enough for them to still breathe. Now would
10 that, if you did that and they were confined to a part
11 of the lake, would that have adverse effects on them?

12 A If the pushups were marked
13 early in the season, if you knew, for instance early
14 in the season where your seismic line was going and you
15 had people on the grounds to identify pushups on those
16 sloughs, with a wooden marker or some such device, you
17 could, you know, collect snow from that slough without
18 destroying individual pushups.

19 Q Right, but assuming that
20 we did destroy the pushups on one end of the lake, so
21 that all the muskrats were forced to go down to the
22 other end, would this damage them and would they --
23 I'm thinking about starvation and well -- as well as
24 intraspecific stress.

25 A Well, again, I think it's
26 safe to assume that it wouldn't be positive for the rats.
27 I am not competent to say what the net impact of elimina-
28 ting varying degrees of pushups from a given population
29 is.

30 Q O.K. Now, in your prepared

H. Monaghan
Cross-Exam by Evans

1 evidence, you discussed the regulation requiring that
2 charges be set at least twenty feet from the bank in the
3 area -- I guess that's in areas where there's muskrats,
4 is that correct, or is that in all areas?

5 A I understand that's a
6 common procedure and it prevails in any area where there's
7 a water body.

8 Q Now, I believe you referred
9 to the term "stack", what does that mean with respect to
10 this?

11 A I don't think I referred
12 to stack in this evidence, in the evidence just given.

13 Q What does the term mean?

14 A It's been suggested that
15 in some cases, at least a number of years ago, that shots
16 were stacked, in that there was the amount of explosive
17 used would be increased to try and compensate for not
18 being able to go across water bodies.

19 Q So if you stacked the
20 charges, it might have a more detrimental effect on the
21 muskrat population?

22 A It's possible.

23 Q Is there any regulation
24 on stacking charges?

25 A I'm not aware of any.

26 Q O.K., in the Mackenzie
27 Delta, do muskrats den in the banks of the lakes?

28 A Yes, they do. What per-
29 centage are resident in banks rather than houses, I'm
30 not sure.

H. Monaghan
Cross-Exam by Evans

1 Q Now, if a muskrat had dug
2 under the bank to build his den, could you, by placing
3 a charge twenty feet from the bank drop the charge right
4 on top of him and thus, obviously, adversely affect his
5 well-being?

6 A I think that's a fair
7 assumption.

8 Q O.K. Now, on page 13 of
9 your prepared evidence, you made a reference to Mr.
10 Urquhart or Dr. Urquhart, I'm not sure which, and you
11 stated that he emphasized in his studies the effect of
12 oil exploration on wildlife. That the -- we should
13 concentrate on studying the effects of oil exploration on
14 wildlife with respect to social behavior and physiological
15 stress. Would you agree with that?

16 A Yes, I agree with that.

17 Q Do you know if any studies
18 of this sort are presently being carried out?

19 A No, I'm not aware of any
20 studies that are covering that subject.

21 Q Do you know if there's any
22 study underway of muskrat disturbance in general?

23 A Yes, I understand one has
24 been proposed and will be instigated shortly if it hasn't
25 already begun.

26 Q I think you made reference
27 to recording gross observable responses, are we still at
28 that stage or have we advanced from that?

29 A In the case of ungulates,
30 yes.

U. D. 19419

Cross-Exam by Evans

1 Q How about muskrats?

2 A Well, I'm hopeful on the
3 study that's underway now that we will be looking at
4 more than immediate gross damage to rats, but rather
5 possible effects on subsequent reproductive success.

6 Q What kind of research do
7 you think we should be carrying out? You mentioned that
8 one specific program, do you think we should be doing
9 other studies?

10 A Are you referring to rats
11 or to ungulates, or carnivores?

12 Q Well, I was referring to
13 rats, but you can address yourself to either.

14 A I'm not completely aware
15 of the details of the study that's now planned for
16 looking at the impact of seismic activity on the rats,
17 but I assume that it will be carried out in the detail
18 and with the follow-up required to answer the questions
19 that we have on the impact of seismic activity on rats.
20 On ungulates, both in the boreal forest and in the Arctic
21 islands, if we're looking at muskox and caribou specific-
22 ally, the work that was referred to by both Urquhart
23 back in '73 and more recently by Geist, I think is
24 required, in that somehow we have to be able to measure
25 the net impact of varying forms of disturbance to these
26 animals. One way of doing that is getting right down to
27 physiology of the beasts and this could be through heart-
28 rate measurements, using telemetry as suggested by
29 Geist, which would be good, hard, quantitative research.

30 Q O.K. Now, in your pre-

H. Monaghan
Cross-Exam by Evans

1 pared testimony, you mentioned that you consider flight
2 level restrictions unenforceable. I think that we've
3 heard from other people at this Inquiry that this is
4 quite a serious problem, particularly with respect to
5 caribou. How do you think we can deal with this problem
6 if restricting flight levels is not enforceable, what do
7 you think we should do?

8 A I think it's probably one
9 of these cases where the education or talking to the
10 people involved to indicate the net impact of what they
11 may be doing would be quite successful. But failing that,
12 I guess prosecution would help reduce it, but, I do be-
13 lieve that it is something that is largely unenforceable.

14 Q I'm a little confused,
15 you said you thought that prosecution would help reduce
16 it but you just said you don't think that we can catch
17 them.

18 A Well, I guess what I'm
19 saying is that it's largely unenforceable, but you may
20 be successful in finding an individual that's violated
21 the operating condition and successfully prosecuting
22 him. The odds on that, I think, are fairly slim.

23 Q Well, would you recommend
24 a very stiff penalty if we did catch a violator?

25 A I have no comment on that.
26 The level of penalties aren't my field.

27 Q O.K., fair enough. Now,
28 you mentioned in your testimony that the Land Use
29 Advisory Committee does not consider cumulative impact
30 in consideration of land use regulations. I assume that

H. MONTGOMERY
Cross-Exam by Evans

1 you mean that you consider each seismic application --
2 or each permit for a seismic -- each application for a
3 seismic permit, separately, without considering the over-
4 all effect.

5 A That is correct.

6 Q Do you think that some
7 consideration should be given to the cumulative effect?

8 A Yes, if you're to manage
9 seismic activity in relation to the impact on wildlife
10 in a comprehensive manner, which, I assume, is desireable.

11 Q Would it be fair to say
12 that the main reason why this isn't considered is that
13 very little research has been done into the cumulative
14 impact of seismic work?

15 A I'm not sure why the pro-
16 cedure isn't used, but to try and consider cumulative
17 impact when you don't have good, hard data on the impact
18 of a single operation would be difficult.

19 Q Are you saying we don't
20 have that?

21 A In certain cases, we don't
22 have it.

23 Q I guess that makes the
24 question why. Why don't we have this cumulative data on
25 individual operations?

26 A Well, I think the question
27 is maybe misleading a bit in that you either have data
28 on individual operations and data on cumulative operations.
29 You can't have cumulative information without having
30 individual information.

H. Monaghan
Cross-Exam by Evans

1 Q I realize that, O.K. You
2 said, I think, we don't have, in lot's of cases, good,
3 hard data on individual operations and I was wondering
4 why.

5 A The data simply isn't
6 available, in certain cases.

7 Q Well, you mentioned several
8 times this muskrat study, that's an ongoing study is it?

9 A No, the muskrat study
10 was carried out and left. In other words, it was com-
11 pleted. It was not possible to complete some phases of
12 it due to a change in plans of the operator, but, as
13 I indicated in my evidence, the data was not completely
14 conclusive. I did not provide conclusive evidence that
15 there was no negative impact. I believe that the
16 second study that will be instigated shortly will cover
17 off some of these areas and look at gathering follow-up
18 data to look at any impact on breeding success or success
19 in raising young, in subsequent seasons.

20 Q Now, I'd like to read a
21 quote from Mr. Urquhart's article that you referred to.
22 That's at page 140 and 141 of that article. He says:

23 "From a scientific standpoint, a number of our
24 studies have not been conducted in an appropriate
25 manner. Until preliminary surveys have been conduc-
26 ted, it is impossible to set up control areas which
27 are essential for comparison with experimental sit-
28 uations. "

29 And he later states:

30 "As it is, we are obliged to follow the exploration

H. Monaghan
Cross-Exam by Evans

1 companies across the island --"

2 In this case, he was referring to Banks Island.

3 "-- making what observations we can and theorizing
4 on the basis of the results."

5 Now, that seems to me to be -- he's talking about a
6 kind of research that's, in a sense, being done backwards
7 and a lot of the other research that's being done in the
8 north seems to be of the same fashion. Would you agree
9 with that statement?

10 A Could you given me that
11 page reference again, please?

12 Q It's 140 and 141.

13 A I'm lost, I can't find it
14 but if what he's saying is that you cannot manipulate
15 the disturbance to document the impact on wildlife, but,
16 rather, the observations are incidental. It was true
17 in his study in that, I understand he did not have the
18 opportunity to manipulate equipment, for instance in,
19 you know, in his experimental design, but, rather, he
20 simply monitored what occurred as industry proceeded.

21 Q Well, is that a procedure
22 that's quite common in the north?

23 A In the rat study, observa-
24 tion were taken prior, during and after the activity
25 took place. There was no effort made to modify the actual
26 activity. I'm not sure that I want to generalize, is
27 what I'm saying. In those two particular studies it occur-
28 ed that way.

29 Q You would agree, of course,
30 that the better --

H. Monaghan
Cross-Exam by Evans

1 MR. BAYLY: I was just going
2 to say, Mr. Commissioner, it may be very difficult for Mr.
3 Monaghan to respond to that without having a better look
4 at that and perhaps if he has ^{an} answer to it after coffee
5 break, we could come back to that. Give him a chance to look
6 over that passage.

7 THE COMMISSIONER: O.K.

8 MR. EVANS: I'll leave my further
9 questions on Urquhart's article till later, then. Mr.
10 Monaghan, on the last page of your prepared evidence,
11 you made a statement about:

12 "The Land Use Advisory Committee requires the
13 authority to initiate research."

14 From that, what I -- am I correct in assuming that it
15 doesn't presently have that authority?

16 A The Land Use Advisory
17 Committee, as I understand it now, does not have the
18 authority to initiate research.

19 Q Do you think it would be
20 a good idea if it did?

21 A If we want to manage
22 activity in relation to wildlife, it would be desirable
23 for the people, I guess, providing recommendations to
24 have the authority to initiate research from a purely
25 technical standpoint, it would be desirable.

26 Q Well, that's another question
27 on Urquhart, I'll leave that one. On page nine, you
28 mention a report by Gray. Now, I've been informed that
29 Mr. Gray later observed some of the effects of harassment
30 on a group of muskox. Are you familiar with these observa-

H. Monaghan
Cross-Exam by Evans

1 tions?

2 A I understand that as a
3 result of a number of animals being buzzed, he happened
4 to be observing them and there was an alteration in their
5 behavior as a result of this for some time following
6 the harassment.

7 Q You don't want to comment
8 further on Gray's observations?

9 A Not except to say that
10 there would appear to be a difference between immediate
11 observable response and perhaps an alteration -- maybe
12 I can state it more clearly. On causing disturbance to
13 wildlife, there is an immediate observable response by
14 the particular species and that that does not necessarily
15 mean that's the total end product of that disturbance, but
16 that in fact, there may be other factors involved. For
17 instance, the number of feeding minutes versus resting
18 minutes of the animal may be altered for several days
19 after and that it should be looked at carefully in light
20 of the net cost to that animal in terms of energy and
21 that you can't really get that very completely by simply
22 watching for an immediate reaction by the animal which is
23 really the point that Geist has raised, as did Urquhart
24 in his study.

25 Q Now, in a number of places
26 in your prepared evidence, you cited other people. Would
27 I be correct in assuming that you agree with the state-
28 ments that you quote in your paper?

29 A The people that are cited,
30 I accept what they've said.

H. Monaghan
Cross-Exam by Evans

Q In other words, you--

THE COMMISSIONER: Accepts what they said. I understand that. It doesn't have to be put in other words.

MR. EVANS: Yes, Mr. Commissioner I guess those are fairly simple words. At page ten, you discuss what we need to know about the impact of seismic related activities and then you list a number of things that you think should be done. Have any of those been undertaken to date?

A I think in this resume, I've cited all the relevant literature on the impact of seismic on wildlife. The only other studies that directly look at the impact on wildlife that are currently underway that I'm aware of are the rat study proposed for the delta, and I'm not aware of any others. Now, this is on behavioral response. There is ongoing field work to gather more data on the distribution, movements and numbers of various species throughout the Arctic.

Q At the bottom of page eleven of your testimony, you discuss conflicts between bear and man, and you suggest that we conduct research into deterrents. Is there any other viable approach to dealing with conflicts between bears and man?

A Well, I think there's only two choices. Either you control the activities of man -- in other words you don't encroach in areas that are, you know of high densities of bears, or else you control bears. So, I guess you should do both. In fact, you should document denning areas where disturbance can occur.

H. Monaghan
Cross-Examination by Evans

1 But the facts of life are that if you've got a camp in
2 an area that's habituated by bear, that you're going to
3 have to take some measures to keep the two apart.

4 Q Do we have any way of
5 determining high density bear areas?

6 THE COMMISSIONER: Well, there's
7 really no such thing, is there. I understood that the
8 bears, certainly in the western Arctic, required a large
9 area, each of them, for sustenance and that they were
10 fairly widely dispersed. I think that was Dr. McTaggart-
11 Cowan's evidence. Is that right, or is that wrong?

12 A I believe that's right, sir,
13 but there are some areas where there are greater numbers
14 of bears than other areas. I guess what I was referring
15 to in the evidence here is that, for instance, with
16 polar bears, they retreat off the pack ice onto land
17 into what we call summer sanctuaries. You end up with
18 fairly high concentrations of them. I think the extreme
19 example is Fort Churchill. So, if you're going to have
20 industrial development or exploration in an area like
21 that, I think you've got to do two things and one is try
22 not to situate your camp right on a prime area that is
23 occupied by bears and the second thing is that even
24 if you're in a bear -- or in an area that's generally
25 considered bear country is that you're going to have to
26 take certain measures to protect your camp and personnel
27 from the bears. What I'm saying is that there's research
28 is required to develop deterrents to keep ^{bear and} men separated
29 in such areas.

30 THE COMMISSIONER: People who

H. Monaghan
Cross-Exam by Evans

1 study bears know where the areas, then, of highest densi-
2 ty of the bear population are, don't they?

3 A In some cases.

4 MR. EVANS: I don't have any
5 further questions, Mr. Commissioner, with the exception
6 of the work done by Mr. Urquhart.

7 THE COMMISSIONER: Well, maybe
8 we should adjourn for coffee.

9 (PROCEEDINGS ADJOURNED AT 3:00 P.M.)
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H. Monaghan
Cross-Exam by Evans

(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

MR. EVANS: Mr. Commissioner

I understand that Mr. Bayly will be a couple of minutes.
I think we could safely proceed with this part of the
cross-examination, without his presence.

THE COMMISSIONER: All right.

MR. EVANS:

Q Mr. Monaghan, before the
break you were asked to read that passage from Urquhart,
and I assume you have done so. I wonder if you could
comment on it.

WITNESS MONAGHAN: The comment
that Urquhart makes is certainly valid in relation to his
own study, as well as to the studies that I've referred
to in this evidence that I've given that were specifically
related to the impact of seismic and wildlife.

Q Now, I believe that you
mentioned that Urquhart could not set up the experimental
situation, in your prepared evidence. Would you recommend
that further reasearch , you set up experimental situations?

A Yes, I think it would be
necessary.

Q Now, with respect to the
procedure that he spoke of, I guess that the best ap-
proach is the study is an ongoing operation, before the
program takes place. However I suppose that that study at
the same time evaluating the effects of the program is
better than no study at all. Would you agree with that?

A In the former or the latter?

Q Well, that the one is better

H. Monahan
Cross-Exam by Evans

1 | than the other but that the latter is better than nothing?

2 | A Yes, I think to get the
3 | good hard quantitative data that we referred to previous-
4 | ly, it's advisable to get in prior to the disturbance ex-
5 | isting in the area , to get good baseline data and then
6 | monitor the reaction of individuals to the disturbance
7 | so you get an actual measurement of what the effect has
8 | been.

9 | Q Now, in Urquhart's case, do
10 | you know how that study was financed. I understand it took
11 | place in conjunction with the activities of the company,
12 | who was carrying on seismic activity.

13 | A There were a number of parts
14 | to Urquhart's study, and I can't remember the details of
15 | financing. No, I can't remember the details, at this point.

16 | Q O.K. we won't pursue that.
17 | Now, assuming that there's a problem in the area, that it
18 | hasn't been studied and you have an application for a
19 | land use permit, what approach do you take? Do you grant
20 | a permit and then follow up with the study of the effects
21 | or do you require that they undertake a study first?

22 | A It depends entirely on the
23 | conditions. When I review a land use application I look
24 | at it in terms of what exactly the operation entails, what
25 | species are in the area , and what the impact might be
26 | in relation to the data that we have on hand, and in
27 | some cases we've recommended the operation go ahead com-
28 | pletely as outlined by the proponent . In other cases I
29 | have suggested that data be gathered in conjunction with
30 | the program and in some other cases I have suggested the

H. Monaghan
Cross Exam by Evans

1 program be altered, either with an early shut-down date
2 or rescheduling of activities to avoid critical areas dur-
3 ing critical periods. So it varies with each application.
4 You have to use the judgement that you have, on each one
5 as it comes, with the information that you have available,
6 and I might add that the information that you have avail-
7 able may not be necessarily published material. It may
8 be verbal communication with scientists who are working
9 in that area, or at that particular moment. So, in summary
10 then you-- or at least I make the best decision I can
11 with the information at hand.

12 Q Well, Mr. Commissioner, I
13 have one further question that my advisor, Dr. Pimwater
14 thought of during the break. It doesn't pertain to Mr.
15 Urquhart's study, but I nevertheless would like to add-
16 ress it to this witness.

17 One of the potential impacts of
18 seismic operations on caribou, or I'm informed to this
19 effect, results from the shot wires being left behind on
20 the ground. I'm informed that this has been shown to be
21 a problem on Banks Island, in particular. Would you
22 agree with that?

23 A It's occurred in Banks Island.
24 I think even one or two of the heads were packed into the
25 Inquiry here for observation. It's certainly dramatic in
26 that you have a head of the animal and you have a shot
27 wire and it looks like, obviously it's either led to the
28 death of the animal, or impaired it. To what extent that
29 occurs, in other words whether it seriously effects the
30 population, I would really doubt it. In other words it's

H. Monaghan
CROSS-Exam by Evans
Cross-Exam by Gibbs

1 good to see direct evidence like that.

2 There has been, I think on the
3 part of the land use people, efforts made to reduce this
4 sort of thing and based on my personal experience on the
5 north end of Banks Island last winter, where I travelled,
6 quite a few miles of cut lines over a five day to a week
7 period, I did not see any evidence of shot wire on the
8 ground, so obviously , if it was a bad situation, I sus-
9 pect it's not now.

10 Q Was there a problem in other
11 areas as well as Banks Island?

12 A Offhand I can only remem-
13 ber it being a problem on Banks Island. I could be wrong
14 but that's the only one that strikes me.

15 MR. EVANS: O.K. No further
16 questions.

17 CROSS-EXAMINATION BY MR. GIBBS:

18 Q Mr. Monaghan, when
19 you were giving your evidence I tried to keep a list of
20 the animals you mentioned. I wonder if you could confirm
21 that I have them all. You talked about fox, muskrat, bear,
22 caribou, muskox, moose, Dall sheep, and Arctic fox.

23 A I believe that's correct.
24 I don't think I mentioned any other species.

25 Q Do you have any evidence
26 at all that seismic or seismic related activities have
27 caused a decrease in the population of any of those
28 animals?

29 A No, I do not, for the simple
30 reason that, as I mentioned on the Bathurst Island sit-
uation, that the only-- in most instances, the only known

H. Monaghan
Cross-Exam by Gibbs

1 quantity is the presence or lack of seismic activity. In
2 other words it's the only thing that can be identified.
3 It's the only variable that's known in detail. We do not
4 know the other variables that may apply in a situation
5 like Bathurst, abiotic and biotic.

6 Q Do you have any evidence
7 at all, that seismic or seismic related activity has
8 caused any concentration of any of those animals to be
9 relocated by way of a different habitat?

10 A Local displacement occurred
11 in Banks Island, according to Irquhart, with muskox
12 There may be speculation that intensive seismic programs
13 may have affected the distribution of animals such as
14 caribou, but I'm not aware of any good hard documented
15 evidence where all the facts are known, and that would
16 indicate that this has occurred.

17 Q Yes, aside from the spec-
18 ulation, there is no evidence of either a decrease in
19 population or a change in habitat.

20 A I have no good hard evidence
21 to indicate that, no, with the possible exception of local
22 displacement of muskox.

23 Q Which may have returned.

24 A I presume they would re-
25 turn, but how long it would take, and what the net effect
26 of that would be I do not know.

27 MR. GIBBS: Those are all
28 my questions sir.

29 MR. MARSHALL: I have no
30 questions.

H. Monaghan
Cross-Exam by Goudge

CROSS-EXAMINATION BY MR. GOUDGE

Mr. Monaghan,

Q

while you may have no evidence in response to Mr. Gibbs questions, I take it you have no evidence that runs the other way either; that indicates that seismic has definitely not had such an effect, and that's what you're concerned about.

MR. GIBBS: Surely that would

be an impossible thing to prove that in the negative.

MR. GOUDGE: If Mr. Gibbs is

prepared to acknowledge that no such evidence exists, that's all I ask.

Q

Could you confirm

that you have no such evidence?

A Yes I would.

Q And your suspicions lead

you to want to find out more about it.

A That is correct.

Q Yes, Now dealing with

muskrat in particular, you've referred on page four--

THE COMMISSIONER: Excuse me,

I thought the burden of all that you've said was this: that you don't know enough about the interaction of seismic work and these animal populations, to be able to say whether seismic work has had any impact or not, apart from some isolated instances that you cited. Is that about the size of it?

A That's quite correct, sir.

What I'm saying is that I don't have a good enough-- we don't have enough data to in fact state whether it has had a negative impact on populations, or not, and we have

1 not been able to distinguish if it would have between
2 short term and long term impact, so I guess I have to
3 respond affirmative to both sides of the argument.

4 THE COMMISSIONER: Yes, yes.

5 MR. GIBBS: A great position
6 to be in, Mr. Monaghan.

7 MR. GOUDGE:

8 Q Dealing with muskrat in
9 particular, Mr. Monaghan, you refer on page four to
10 Martin's study and you say that it didn't find deleterious
11 effects, but that it was inconclusive. I understand you
12 to say that . Is that so?

13 A That is correct.

14 Q Yes. And the thing that you
15 would very much like to know, that Martin wasn't able to
16 tell us, is what effect, if any seismic might have on
17 reproductive rates, particularly in so far as muskrat are
18 concerned.

19 A That is my main concern.

20 I think there could be more work done on the impact--
21 direct impact to rats of blasting, perhaps physical damage
22 under varying conditions, but my primary concern is
23 reproductive success subsequent to a program.

24 Q Yes, and you said, I think
25 that there is a study proposed, at least for the delta
26 concerning rats. Is that so?

27 A That is correct.

28 Q Yes. Is that study presently
29 under way or is it off sometime in the future?

30 A I think the field work is

H. Monaghan
Cross-Exam by Goudge

1 to begin almost immediately.

2 Q Yes, well is either that
3 study or was the Martin study a condition of a land
4 use permit?

5 A The agreement was made with
6 the company-- if I remember right, the agreement was made
7 at the time the land use permit was being reviewed. As to
8 whether it was actually put into the operating conditions
9 that the study be carried out concurrently, I'm not sure.

10 Q Are you speaking there of
11 the Martin study?

12 A That is correct.

13 Q What about the proposed
14 study?

15 A The proposed study is under
16 discussion. The company that it may go on in conjunction
17 with has not as yet been issued the land permit as I
18 understand it.

19 Q Let me ask you, whether in
20 your view, this is a device which might be used to pro-
21 mote future research; the attachment of research conditions
22 to land use permits.

23 A It could be used.

24 Q Is it desirable in your
25 view ?

26 A Under certain circumstances
27 I think it would be desirable.

28 Q The research, I take it,
29 would in most instances be carried out by-- in the
30 biological sphere-- biologists on contract or government

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Cross-Exam by Goudo

1 biologists with the funding from the permittee.

2 A Not necessarily. In other
3 words, the funding for the study is not my concern. The
4 resultant data is.

5 Q I see. Now, dealing with
6 grizzly bears, you spoke of the possible impact of seismic
7 on grizzlies. One of the aspects of grizzly activity that
8 concerns me is the activity that takes place immediately
9 following the emergence from the den. Would you agree with
10 me that that activity is one where the grizzly requires
11 a high energy diet?

12 A I'm not competent to compare
13 the energy requirements of grizzly bear seasonally at this
14 time.

15 Q I see. Would you feel the
16 same diffidence in agreeing with me that the emergence
17 from the den time of the grizzly's existence is a crit-
18 ical time?

19 A As a generalization I would
20 assume that to be true.

21 Q Yes , and the area occup-
22 ied by the grizzly, in emerging from the den is an area
23 that is therefore peculiarly important to the grizzly's
24 life cycle.

25 A I would assume that to
26 be correct.

27 Q Yes, and I take it that in
28 regulating seismic then, impacts on grizzlies denning
29 have to be taken into account, but as well, impacts on
30 grizzlies using the area they use immediately following

1 emergence from denning is also important.

2 A I assume that to be correct.

3 Q To be fair to you, you sound
4 very diffident. I take it , you view that as being on the
5 extremities of your professional experience.

6 A Yes. The other reason for
7 expressing doubt is the concern with bear, as I see it, is
8 the impact of an operation immediately in the area of the
9 den when the den is occupied by a bear. In other words if
10 the bears are moved from the den before it would naturally
11 come out of it, there may be fairly strong negative impact
12 on the individuals as well as perhaps the cub. But the
13 main problem remains bear in camp situations, and that
14 has been my main concern, trying to keep men and bears
15 apart at that time.

16 Q Yes. I was suggesting a
17 third problem area for you, and that is the sensitive
18 time when the grizzly emerges from the den. Are you pre-
19 pared to acknowledge that as a third problem area?

20 A Yes.

21 Q Now dealing with caribou
22 you refer on page six of your paper to the Slaney work
23 on the Peary caribou, and I'm curious because you don't
24 give ^{it} to us and I'm not familiar with it. If you can tell
25 us what comments Slaney made on the reaction of Peary
26 caribou to vehicles and blasting.

27 A The work was carried out
28 on Bathurst Island , as indicated approximately a year
29 ago, the spring of '75. They, if I recall correctly ,
30 observed that there was no strong reaction of caribou to

1 either seismic lines or blasting, but the problem was, is
2 that there were so few caribou in the area the number of
3 interactions was almost nil, I think it was a very few
4 animals, and based on that there could be no real con-
5 clusions drawn.

6 Q I see. On page five you
7 refer to some of Urquhart's observations concerning the
8 limited response of caribou to seismic operations on
9 Banks Island. I take it that's the jist of what Urquhart
10 says. Is that so?

11 A That is correct.

12 Q Yes. I wonder whether in
13 your view that could be explained by the limited contact
14 that caribou may have had with seismic operations.

15 A You mean in those particular
16 cases or--

17 Q Yes, in those particular
18 cases, or if you wish to generalize.

19 A I'm sorry, are we getting
20 at the reaction that he noted or the behavioral response
21 of caribou to a new physical characteristic in the land-
22 scape.

23 Q I'm trying to combine them.
24 He noted a reaction, and let me suggest to you that the
25 reaction may have been due to the fact that caribou are
26 newly experiencing seismic and haven't yet learned to
27 react away from it, hence the limited response.

28 A Urquhart's data, where he
29 talked about the response; a lot of it was gathered in
30 the fall of 1970 which was the year that seismic started

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1 in Banks Island, so you could well be right.

2 Q What's your opinion? Is that
3 the proper explanation?

4 A It may or may not be. I don't
5 know.

6 Q Yes. Now, are you familiar
7 with a man by the name of Hoffman who has indicated, as
8 I understand it, that insofar as disturbance of the
9 Porcupine caribou herd exists in the Richardsons, the
10 greatest factor disturbing them is the hunting of caribou
11 by skidoo.

12 A You're referring to a short
13 report to us, or me in particular by Hoffman, and he
14 speculated that the seismic program that occurred west
15 of Aklavik may have brought on spring movements earlier
16 than normal, for that group of animals, but in the same
17 report he did indicate a possible negative impact
18 of a lot skidoo travel associated with skidoos. Yes, I'm
19 aware of it.

20 Q And I take it, once again,
21 you're prepared to accept that.

22 A Not necessarily. He had no
23 good data, either on the seismic program or on the skidoo
24 traffic. It was merely an impression he had and he sug-
25 gested it be looked into.

26 Q And I take it, until you
27 see further data, you're not prepared to express an opin-
28 ion on the validity of his thesis.

29 A That is correct.

30 Q Now, on page 16 of your

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1 paper, you refer to possible long term consequences
2 arising from cut lines existing for considerable lengths
3 of time in the boreal forest; consequences for migrating
4 caribou. Is that the thrust of the first paragraph on page
5 16? I hope I'm not reading from the old document.

6 A One of us is. I've got the
7 new one, and you've got the middle one, and if you could
8 refer to the specific paragraph that you're after maybe
9 we could--

10 Q Well, is that your view.
11 Let me put it to you without asking you for a reference,
12 that there is a possible long term adverse impact on
13 migrating caribou, due to the existence over the long
14 term of cut lines in the boreal forest.

15 A I think there is a possible
16 long term negative impact, yes.

17 Q Would you classify it as
18 substantial or again are you in the area of needing
19 further research?

20 A Further research is required.
21 If Geist's comments are to be taken, it would appear that
22 there could be long term negative impact, but to quantify
23 it, further research is required.

24 Q So this is one of the areas
25 where you may have a little stronger suspicion although
26 you still don't have evidence sufficient to bring you
27 down on either side of the argument Mr. Gibbs and I have.

28 MR. GIBBS: I wasn't arguing
29 with you. I was just asking him to answer a question.

30 MR. GOUDGE:- O.K. the questions

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1 Mr. Gibbs and I posed to you.

2 THE COMMISSIONER: There are
3 two sides of the same coin. That's what you were--

4 MR. GOUDGE:

5 Q Yes, my question of the
6 witness is, isn't this a case where his suspicion has him
7 leaning on one side?

8 A Yes, if we consider, not
9 only existing cut lines, but the possibility of an
10 increasing number of cut lines in the future.

11 Q Yes. Is your suspicion
12 strong enough to make you an advocate of the need to
13 develop seismic techniques that avoid the need for cut
14 lines?

15 A Well, as was mentioned
16 earlier this morning, I think it would be grand if seismic
17 could be carried out in a fashion that would not create
18 seismic lines. I am not in a position to state that
19 seismic should not occur in these areas because they
20 create cut lines. What I'm saying is that it is desirable
21 to carry out research to quantify the net impact of exist-
22 ing cut lines plus any future cut lines that may occur, so
23 in fact they could be managed, in other words, if necessary
24 limited. I wouldn't have a strong position on pushing for
25 alternate forms of running seismic programs until we have
26 some more data available, to indicate net impact.

27 Q Now, sir you spent the tail
28 end of your paper dealing with, in specific terms, cum-
29 ulative research needs. Let me ask you-- I take it, long
30 term research is obviously, in your view necessary as a

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1 backup for land use regulations.

2 A Yes.

3 Q And I would ask you whether
4 you would see that being provided in the existing struct-
5 ure , at least by the Northwest Territories Fish and
6 Wildlife Service. Is that the best organization that you
7 see at present?

8 A I'd prefer not to comment
9 on that. That comment could be directed perhaps to someone
10 else in the organization.

11 What I'm stating is
12 that I'm looking at the technical aspects of impact and
13 not administrative.

14 Q I see.

15 Now, lastly sir, you talk
16 about minimum height restrictions and one of my friends
17 asked you about this . You say in your view , they're
18 largely unenforceable and I take it, you're referring to
19 restrictions as a protection for the animals you speak of.
20 Does it apply to birds as well, in your view? I take it,
21 it does. I didn't put that very well. Let me put it
22 another way. If they're unenforceable for animals, they're
23 unenforceable for birds, because the planes can't be kept
24 above the minimum height.

25 A I would assume it to be
26 true, again stressing that education may, in the long
27 run prove more beneficial.

28 Q Let me ask you why you hold
29 the view that they're unenforceable. Is that based on any
30 data , or simply your own incidental experience?

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Cross Examined by Mr. Bayly
Re-Examination

1 A It is not based on any data.
2 It is based on my experience in the field as an officer,
3 and what I'm referring to is the fact that, I think you
4 would have to have a fairly well trained person who would
5 just happen to be in the area that was being subjected to
6 low level aircraft activity buzzing wildlife.

7 Q So you rely on the good
8 faith of the pilot or you have large scale, on the ground
9 enforcement officers, if you're going to rely only on
10 this device.

11 A That is true, and that's
12 why perhaps, I lean towards the educational approach.

13 MR. GOUDGE: Yes, thank you.
14 I have no more questions of this witness sir.

15 THE COMMISSIONER: Any re-
16 examination?

17 MR. BAYLY: I have one question
18 in re-examination.

19 RE-EXAMINATION BY MR. BAYLY:

20 Q Mr. Monaghan, in answer to
21 a question read by Mr. Evans, you spoke about alteration
22 of behaviour that was studied by Mr. Gray, and later in
23 response to a question by Mr. Gibbs, you talked about
24 muskox and changing habitat, as a documented observation
25 of somebody. Was this-- were you talking about one and
26 the same set of observations. Is that what Mr. Gray ob-
27 served?

28 A The local displacement I
29 was referring to is noted by Urquhart.

30 Q All right. So Mr. Gray's

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1 alteration of behaviour was not a change of habitat.

2 A The information that I was
3 made aware of verbally, was related specifically to a
4 change in feeding minutes versus resting minutes versus
5 the period in which the animals were moving, a comparison
6 being made after the harassment with data he had before
7 the harassment occurred.

8 MR. BAYLY: All right. That's
9 the only question I had in re-examination. Thank you very
10 much Mr. Monaghan.

11 THE COMMISSIONER: Well, thank
12 you very much Mr. Monaghan. We appreciate you attending.
13 We're very much in your debt, sir.

14 MR. BAYLY: Mr. Commissioner,
15 I have Mr. Trudeau here and he's ready to go on. I might
16 point out that this is Mr. Hugh Trudeau, sir.

17 THE COMMISSIONER: Right.

18 HUGH TRUDEAU, sworn:

19 DIRECT EXAMINATION BY MR. BAYLY:

20 MR. BAYLY: Mr. Commissioner,
21 I understand that Mr. Trudeau has been sworn and I wonder
22 Mr. Trudeau, if before going into your evidence you
23 would--

24 THE COMMISSIONER: Pause a
25 moment, would you please?

26 Sorry, Mr.
27 Trudeau, carry on now.

28 MR. BAYLY:

29 Q I wonder Mr. Trudeau if
30 you could go over your resume of experience before the

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in chief

1 Inquiry.

2 A Yes, certainly

3 I went through the elementary and high school, through
4 the Manitoba and the Alberta system, following which I
5 served for three years in the R.C.N. I moved to the
6 Northwest Territories in 1965 and I began my service with,
7 what was then known as the Department of Fisheries in
8 1967. From '67 to '69 I served in various casual positions
9 with the service , both in the enforcement and various
10 technical capacities.

11 I went on permanent staff in
12 1969, as a what we call a GT 1, the lowest level enfor-
13 cement officer. From 1970-1972 I was a level 2 enforcement
14 officer, and in the later part of 1972 I was asked to
15 head up, what we call the Environmental Control Section
16 for the Fisheries and Marine Service. Later in that year,
17 through reorganization and one thing and another , I
18 moved up to a level 4, as officer in charge of the western
19 sub-district, which included all of the Mackenzie Valley,
20 the delta, Banks Island, and all of the high Arctic islands,
21 in other words the area that was being utilized for oil
22 and gas.

23 In 1975 I was appointed as Chief
24 of Enforcement for Fisheries and Marine Service, western
25 region, and as of February 9th of this year I am acting
26 District Manager for the Fisheries and Marine Service
27 in the Northwest Territories.

28 I received, while in the service
29 of the Fisheries Department, several courses on-- in
30 training, courses, covering such things as supervisory

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1 management, effective report writing, a law enforcement
2 course through the Vancouver Police Academy, Canadian
3 Emergency measures, and as well, Arctic survival and that
4 sort of course, and I'm also affiliated with the St.
5 John's Ambulance. I hold Advanced First Aid, First Aid
6 Instructor's certificates and I'm presently the chief
7 Training Officer for St. John's Ambulance in the North-
8 west Territories.

9 As for my associations, I am and
10 have been since the inception of that committee, a mem-
11 ber of the Land Use Advisory Committee and as of this
12 February, as Acting District Manager, I'm also a member
13 of the Arctic Waters Oil and Gas Advisory^{Committee}, and within the
14 Department of the Environment, the Arctic Environmental
15 Steering Committee.

16 I have been involved for the
17 past eight or nine years, in fisheries management at all
18 levels with particular emphasis on regulations and law
19 enforcement. I have been associated with other agencies
20 responsible for wildlife management, non-renewable resources
21 management, as for instance my four years with the Land
22 Use Advisory Committee, and I have several years of ex-
23 perience in training, both as instructor and program
24 manager with the Fisheries and Marine Service and with
25 St. John Ambulance. Much of my work has been with
26 Native Canadians, both Indian and Inuit peoples of the
27 Northwest Territories where I've resided for the last
28 ten years.

29 Q Thank you, Mr. Trudeau. I
30 wonder if we could turn to the beginning of your present-

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1 ation on seismic and its effect on fish.

2 A The oil and gas industry,
3 mining industry and various agencies of the Federal
4 Government have been actively involved in the development
5 of the resources of the N.W.T. for many years. The
6 Department of Fisheries became involved with the commerc-
7 ial fishery on Great Slave Lake almost 30 years ago and
8 has had personnel stationed in the N.W.T. since that time.
9 It was not until 1971, however, that the Department be-
10 came actively involved with the industrial activities
11 associated with the search for oil and gas reserves.
12 Prior to that time involvement was minimal in those fields
13 and usually related to problems associated with the use
14 of explosives in lakes or the construction by industry of
15 temporary crossings of rivers to gain access to areas of
16 interest.

17 Until 1971, there was no require-
18 ment within the Fishery Service for industry to submit
19 plans for forthcoming programs, to report their presence
20 in the field or to report any problems encountered which
21 might have an effect on the aquatic environment. It was
22 left to the Department to detect these activities in the
23 field by conducting patrols usually associated with
24 commercial fisheries and to take the necessary action to
25 prevent or rectify problems which might occur. There was
26 a small force of Fishery Officers located in Hay River
27 with a small operation budget to work with, and the whole
28 of the N.W.T to be covered. The Department's activities
29 were necessarily geared to commercial fisheries. It is
30 not surprising, therefore, that little attention was

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1 paid to industrial activities which were taking place,
2 prior to 1971.

3 The discovery of oil and gas in
4 Alaska in 1967 added a new impetus to the search for
5 hydrocarbon fuels in the N.W.T., and the level of activity
6 increased quickly. The Department of Fisheries concern
7 was growing as industrial activity increased, and by 1970
8 and '71, there were plans established, or to establish
9 rather, offices in Fort Simpson and Inuvik in order to
10 better regulate these activities from the point of view
11 of protecting the fishery resources of the N.W.T., and
12 these offices were finally established and manned in 1971
13 and '72.

14 The district headquarters was
15 moved to Yellowknife in 1971. This office is staffed by
16 the District Manager, Chief of Enforcement, an administrat-
17 ion support staff and three Fishery Officers. The Hay
18 River station is our largest single facility in the N.W.T.,
19 and it contains a bacteriology lab, offices and equip-
20 ment maintenance facilities.

21 At the same time-- this would
22 be in 71/72 approximately, a set of guidelines was pre-
23 pared indicating the Department of Fishery's concern and
24 giving guidance to industry to enable them to comply with
25 the legislation then in effect. A system of reporting
26 proposed activities was incorporated in the guideline
27 which would permit the Department a chance to review,
28 assess and respond to each program in advance, thus
29 hopefully avoiding problems in the field.

30 This guideline was no sooner

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distributed to industry, than the Department of Indian and Northern affairs enacted their Land Use Act and Regulations and began a similiar exercise. It was then agreed to use the Indian Affairs legislation and the resultant Land Use Advisory Committee as the focal point for submissions from industry to government and to include the Department of Fisheries requirements in the conditions of the Land Use Permit. This was a beneficial arrangement to both industry and government as it saved a great deal of expense in administrative costs and unnecessary duplication and delay in processing.

The Land Use Advisory Committee has been criticized many times and from many quarters since it's inception in 1971, but in fairness to those who set it up and got it working , in my view it must be viewed as a success. In the last four years it has processed hundreds of applications, and tried to follow each program through to completion, ensuring that minimal environmental damage takes place. It has not always been successful , however, and it is the failures of the system which get the greatest public attention.

The evolutionary process which has taken place in this committee over the past four years should continue. As the member agencies gain experience the benefits to all concerned should be realized in realistic conditions attached to Land Use Permits which will permit the best use of resources with minimal environmental effects.

Programs which were to be conducted in the aquatic environment required a licence from

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1 the Department of Fisheries if explosives were to be used
2 and I refer you to section 5 subsection 5 of the North-
3 west Territories Fishery Regulations, which at the time
4 that the Land Use Committee came into effect was section
5 4, subsection 8. In most cases this involved extensions
6 of land seismic programs across rivers and lakes, but as
7 the search for hydrocarbon extended off the Arctic coast
8 into the Beaufort Sea, this licence became the only auth-
9 orization required, as it was outside the terms of refer-
10 ence of the Northern Inland Waters Act and the N.W.T.
11 Land Use Act. In most cases however, these offshore pro-
12 grams are still submitted to the Land Use Committee for
13 response, as well as to the Fisheries and Marine Service
14 for the issuance of the licence. The applications are
15 distributed to the member agencies for comment and a
16 letter is sent by the Department of Indian and Northern
17 Affairs pointing out the concerns expressed by the com-
18 mittee and usually suggesting conditions which should
19 apply to the program.

20 Now, before I discuss the most
21 obvious fisheries problems associated with the marine
22 seismic work I would like to briefly outline some of the
23 fisheries problems associated with land seismic.

24 The areas in which this type
25 of activity takes place are almost always difficult to
26 get to. In gaining access to remote areas it is necessary
27 to clear trails through brush and cross rivers and lakes,
28 and here is where serious damage can be done. The practice
29 before the Fisheries Service got involved was to simply
30 bulldoze logs, brush, dirt, as well as snow and ice into

1 the stream to construct a temporary bridge. These cross-
2 ings were left for the most part, to be removed by the
3 spring flood. We found, however that these crossings did
4 not wash out quickly and in some cases, logs and trees
5 were still in place many years later. Initially, these
6 crossings act as dams causing flooding upstream and result-
7 ing in destruction of vegetation and erosion of the banks.
8 They may also destroy fish spawn on the downstream side
9 by restricting the flow of water. When the crossing does
10 finally wash out , the debris and sediment may cover
11 spawning areas or the siltation delay spawning runs into
12 the stream. Cuts made on the banks result in long term
13 erosion and downstream siltation problems which could
14 last for several years depending on how quickly the area
15 re-vegetates. In the delta, this damming action may pre-
16 vent the annual inflow of water into the perched lakes
17 during the spring floods.

18 THE COMMISSIONER: Excuse me,
19 what is a perched lake?

20 A That would be a lake which
21 is higher than the normal level of the river, so as the
22 flood waters come up the water flows into the lakes.

23 One crossing if considered alone,
24 does not represent what would be called a serious envir-
25 onmental problem. Each industry program , however results
26 in many crossings of many streams and in some cases sev-
27 eral crossings of the same stream. This situation, multi-
28 plied by the number of operators and programs per year
29 starts to take on significant proportions and obviously
30 had to be controlled. Operators are now required to pre-

1 serve the layer of vegetation on slopes of rivers and
2 lakes. They can use snow, and pumped water to form ice
3 bridges at crossing sites and these have to be removed
4 upon completion of the program. In the few cases where
5 reinforcement is required , limbed trees maybe used if
6 authorized by a Fishery Officer, and these must be re-
7 moved before break-up. Although there are still many log
8 jams across creeks resulting from crossings constructed
9 prior to 1971, I'm quite confident that this situation
10 has been rectified. It is still necessary every year to
11 remind operators of the requirement to remove ice and
12 snow crossings before the end of the operating season,
13 however.

14 A secondary potential effect of
15 seismic on fisheries is pollution of water bodies by
16 fuel spills and improper garbage and waste disposal. These
17 are regulated in the most part, by the Land Use Permit
18 and in most cases, no longer pose serious problems. A
19 vast improvement in handling procedures for these mater-
20 ials has been evident over the past few years.

21 In spite of these improvements
22 there are still several spills each year, some of which
23 do reach water bodies. The high cost of operating in the
24 north plus the unforeseen problems of weather conditions
25 are incentives to industry to accomplish as much as pos-
26 sible in as little time as possible. Under these pressures,
27 some operators will take calculated risks, such as cutting
28 back on environmental safeguards or proceeding when
29 weather and ground conditions are poor. The Fisheries
30 Service has prosecuted four or five companies in the last

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1 four years for violations of the pollution section; that's
2 section 33 of the Fisheries Act, when the violation was
3 found to have resulted from negligence on the part of
4 the operator. I feel it is essential that this enforce-
5 ment effort be maintained if the environment is to be
6 protected.

7 Once we began to turn our atten-
8 tion to effects of seismic operations on fish through the
9 use of explosives, back in 1971 roughly, we were immediate-
10 ly faced with a lack of knowledge and experience. We knew
11 very little about the techniques used by industry and the
12 problems associated with them. We knew little about ex-
13 plosives and their effects on fish, and in many cases we
14 knew little about the resource we were responsible for
15 protecting. Our first steps into this field were, there-
16 fore uncertain, and many decisions had to be based on
17 what little information we had. At the same time we began
18 to gather as much data as we could, on the problems
19 associated with the use of explosives and the resource
20 we were working with.

21 We tried to bias our decisions
22 to be on the safe side in dealing with lakes and streams,
23 and in most cases we simply refused to authorize the use
24 of explosives in these systems until we knew more about
25 them and the implications of such programs on them. With
26 very few exceptions this is still our attitude.

27 The offshore area of the Beau-
28 fort Sea was treated differently. We did not expect very
29 large concentrations of fish to be found in the greatest
30 part of the area, excepting small bays and inlets along

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1 the coast, and we felt we could proceed with caution in
2 most of these areas.

3 Our review of studies that had
4 been done in other parts of the world, suggested that
5 there was a threshold pressure generated by explosives
6 above which fish kills were a certainty. The threshold
7 appeared to be in the area of 40 pounds per square inch
8 as reported in Hubbs et al in 1952. It also appeared
9 that the pressure generated by an explosive could be kept
10 below this threshold by burying the charge in the sea
11 bottom to an adequate depth. Based on these assumptions
12 we began authorizing the use of explosives in areas where
13 the water was present below the ice-- this is during win-
14 ter of course-- providing that the charges were buried
15 according to a formula that we set out. At first we re-
16 quired a five pound charge of 60 percent geogel or
17 equivalent high velocity explosive to be drilled down to
18 a depth of 40 feet, measured from the top of the charge
19 to the sea floor. Every one pound increase in charge
20 size required a further one foot depth above the charge,
21 so that a 45 pound charge would have to be 80 feet below
22 the ocean floor. This was later revised as more data was
23 received and the present chart being applied is as follows;
24 and I refer here to a report of the Seismic Seminar, that
25 was held in Yellowknife in May of this year. From zero to
26 five pounds- 60 feet, from five to ten pounds- 75 feet,
27 from ten to 25 pounds- 100 feet, 25-50 pounds- 125 feet,
28 50- 125 pounds - 150 feet and 125 pounds to 200 pounds-
29 180 feet.

30 To use the example of a 45 pound

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1 charge, as above, it now requires a depth of 125 feet
2 above the charge, as opposed to the 80 feet as originally
3 required. However, because the consistency of the bottom
4 materials affects the rate of decay of the pressures
5 generated it is impossible to predict the pressures which
6 will be generated in the water.

7 This more stringent requirement
8 can be relaxed in areas we know are not particularly sen-
9 sitive but are applied in all areas where we are unsure
10 of the sensitivity . We have also begun to permit charges
11 to be set at these depths in some small lakes in the delta
12 where we do not believe there are fisheries concerns or
13 where the resource is not being utilized by native peoples.
14 Where we have allowed such shooting we endeavour to mon-
15 itor the area for signs of fish kills after the spring
16 thaw but have not found any indications of such kills to
17 date.

18 Although we are fairly confident
19 that these depths requirements provide adequate protect-
20 ion, we still do not have all of the answers and the data
21 leaves a lot of questions unanswered. We, therefore con-
22 tinue to be very cautious in granting approvals.

23 I would like now to briefly
24 summarize some of the findings of the studies done to
25 date.

26 All of the studies found that
27 explosions kill fish. The nature of the injuries are
28 always similiar. Professor A.P. Knight reports in " The
29 Effects of Dynamite Explosions on Fish" 1901 and I quote
30 " Post-mortem examination of a large number of these

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1 fish all showed similiar effects: great capillary
2 hemmorhage from branches of the messenteric arteries,
3 congestion of the liver and spleen, and invariably
4 rupture of the swim bladder. Portions of the intes-
5 tines were usually forced dorsally into the cavity
6 of the swim bladder where of course, there was also
7 much blood. In rare cases there was rupture of the
8 venous sinuses feeding the auricles." End of quote.

9 Further on he says in reference to the swim bladder, and
10 I quote again

11 "The rupture is evidently due to pressure. When an
12 explosion occurs, there is a sudden liberation of gas
13 tending to produce a compression of the water at the
14 site of the explosion. The wave of compression travels
15 outwards in all directions- upwards, downwards and
16 sideways. The direction of least resistance is of
17 course, always towards the surface of the water,
18 hence the upheaval which follows an explosion. Quite
19 frequently we found three other marked injuries,
20 especially in large fish like pollock. Often in these
21 the liver was compressed into fragments, the ribs
22 were detached from the vertebrae along the whole
23 length, and the flesh or temporal muscle over the
24 skull, after the skin had been cut could be raised
25 from the surface of the bone, leaving it as smooth
26 and clean as a piece of polished ivory. Here again
27 the cause of the dislocation of these structures
28 was pressure. The fish is veritabily flattened be-
29 tween the compression wave of the explosion on one
30 side and the unyielding water on the other. The ribs

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are torn from their attachments, the liver crushed to pieces and forced backwards into the extra-peritoneal cavity, and the flesh raised clean off the flat bones of the head. The surgeon sometimes meets with similar experience in accidents due to crushing.

No external marks or injuries were visible on any of the fish, in either fresh or salt water" End of quote.

Professor Knight's study relied on examination of free swimming fish which just happened to be in the study area. Subsequent studies used caged fish at measured distances from the charge and some took pressure measurements in conjunction with the caged fish. None of the studies that I'm aware of, however did any work on sub-lethal effects. Fish which were alive following the blast were either killed and examined for internal injuries or were re-used in subsequent blasts and then killed and examined. It is not known therefore, if fish which suffered minor internal hemorrhage would eventually recover or if they would die some hours or days later from these injuries, or if they might be more susceptible to predators.

Each study done was limited by the environment and species of fish used for each experiment and therefore the findings varied as to the size of the kill area, the numbers of fish killed. The method of setting and shooting the charges varied from shots jetted into the bottom to open water shots at various depths, and to shots set in ice and frozen in before shooting. All of these variables affected the lethal range of the shots.

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1 There are therefore many variables to take into consid-
2 eration when trying to predict the effect of any given
3 program.

4 Mr. Ermine A. Christian of the
5 Naval Ordnance Laboratory in White Oak, Silver Spring,
6 Maryland published a study he had conducted in 1973, called
7 "The effects of underwater explosions on swimbladder fish"
8 in which he put forward the theory that rather than the
9 pressure being the lethal component of an explosion, that
10 it was the rarefaction which followed the pressure wave
11 which killed fish. He describes a cavitation effect be-
12 hind the advancing pressure wave and relates that to the
13 injuries found in the dead fish.

14 The rarefaction refers to the
15 negative pressures which can be seen on the oscilloscope
16 following the initial pressure wave. Christian, 1973,
17 describes this effect and the resulting cavitation, and
18 I quote again.

19 " A typical underwater explosion generates a spheri-
20 cal shock wave. The peak pressure at the front of the
21 outgoing wave decreases with the increasing range.
22 When the shock wave hits the air-water interface at
23 the surface, a tension wave, the inverted image of
24 the outgoing compression wave, is reflected back
25 down into the water. Water cannot support very much
26 tension. When the negative pressure is larger than
27 some critical breaking pressure, the water is torn
28 into many bubbles, i.e., it is cavitates."

29
30 Mr. Christian points out that the

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1 findings of the many studies done are not consistent when
2 considering only the charge size, for example, Hubbs and
3 Rechnitzer, 1952, found fish near the surface were killed
4 by pressures lower than those required to kill fish near
5 the bottom.

6 Mr. Christian reports, and I
7 quote

8 "Young salmon that were tested by Muir, 1959, could
9 usually survive decompressions of about one atmos-
10 phere; but when the pressure was lowered to the vapor
11 pressure so that the water cavitated, mortality was
12 high. In contrast to these injuries caused by negat-
13 ive pressures, no ill-effects resulted when Rowley,
14 1955 subjected rainbow trout to positive pressures of
15 more than 13 atmospheres."

16 Now these two studies were not related to explosives.

17 Mr. Christian reports that the swimbladder explodes
18 when a fish is within lethal range of an underwater explo-
19 sion, and I quote

20 " Ruptured swimbladders examined in CBL, 1948 tests
21 always showed the edges of holes turned outward and
22 debris from broken blood vessels blown into the
23 abdominal cavity."

24 And this contrasts with the reported injuries found by
25 Professor Knight and others.

26 Now, the question of negative
27 pressures versus a positive pressure , had been considered
28 prior to the Naval Ordinance Lab study being released.
29 Work done by Gulf Oil in conjunction with the Fisheries
30 Service made us aware of two possible aspects of an

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1 explosion, other than the peak pressure, which may acc-
2 ount for the kill. One was the rarefaction or negative
3 pressure and the other was the velocity of the explosive.

4 When considering the rarefaction
5 as recorded on the oscilloscope there was some question
6 as to whether the values recorded could be interpreted
7 as actual negative pressures at the hydrophone. It was
8 felt that it may be a physical characteristic of the
9 crystal in the hydrophone. Many discussions on this sub-
10 ject between myself and Mr. Elders and Mr. Prudholme of
11 Guld Oil failed to resolve this question. The work done
12 by the Naval Ordinance Lab would certainly seem to verify
13 the rarefaction theory, however there are still many
14 variables involved and more work would have to be done.

15 The velocity of the explosive
16 also seems to have an effect on the lethal range of the
17 explosion. It has been demonstrated that black powder is
18 far less lethal to fish than high velocity explosives
19 such as are commonly used for seismic work. Now, this was
20 shown by R.G. Ferguson, in 1962, Hubbs et al in 1952, and
21 others. Ferguson found, and I quote,

22 " Black powder when detonated with an electronic
23 squib, was relatively innocuous to yellow perch"

24 He also says

25 " The nitrone charges, on the other hand, were
26 decidedly harmful to yellow perch and other species
27 of fish. Even a one pound charge killed some perch
28 at distances up to 200 feet"

29 And in conclusion he states

30 " The initial tests of black powder charges detonated

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1 with nitrone primers proved such charges to be most
2 destructive to fish. Subsequent firings of nitrone
3 primers alone indicated that in the black powder,
4 nitrone primer charge, the latter component was the
5 lethal agent."

6 One of the main differences be-
7 tween the black powder and the nitrone charge is the vel-
8 ocity of burning. Black powder has a detonation speed of
9 approximately 2000 feet per second. The detonation speed
10 of dynamite ranges from 4000 feet per second to 23,000
11 feet per second, depending on the strength, intensity and
12 grade. I refer you to M.R. Falk's study of 1973. This
13 velocity is recorded on the oscilloscope as the time taken
14 to rise to peak pressure. If this is the case then the peak
15 pressure may not be as critical as the velocity of the
16 charge. It seems, however, that the high velocity powder
17 is necessary to get good seismic recordings and therefore,
18 cannot be regulated to any useful extent, although I am
19 still pursuing this subject with industry representatives.

20 Having considered all of the
21 variables involved and the many questions left unanswered,
22 it still seems reasonable to try to keep the pressures
23 generated as low as possible for any given charge. It is
24 obvious that we do not know conclusively what lethal range
25 a particular size charge will have as the circumstances
26 vary with the site of the program.

27 In addition to trying to control
28 the pressures generated in the water, we also try to
29 assess the effects of each program on local fish populat-
30 ions. This is very difficult to do in most cases, as the

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1 seismic programs are conducted during the winter months
2 and under ice-- I should say many of them are. In many
3 cases no data is available on the fish resources prior
4 to the program. We try to monitor the area after spring
5 thaw for evidence of dead fish , but to date we have not
6 found any such evidence.

7 We have monitored seismic prog-
8 rams during the summer months when linear explosives such
9 as Aquaflex and Primacord have been used. Linear explos-
10 ives are high velocity explosives with a water proof cas-
11 ing and are manufactured as a cord and sold on reels.
12 This method reduces the actual charge size by spreading
13 the charge over a larger area. For example, 165 feet of
14 Aquaflex 200 grains per foot is equivalent to 4.9 pounds
15 of geogel. Its detonation speed is 20,350 feet per second.
16 We have observed what could be called minor fish kills in
17 the area of 10-20 fish per shot. A major difficulty even
18 in summer months is in determining how many of the fish
19 killed float as opposed to those which sink.

20 Studies which address this prob-
21 lem come up with varying results. Fitch and Young, 1947,
22 indicate a ration which varied from 1 to 1 to 12 to 1,
23 floaters to sinkers. Knight in 1907 found 1/3 of the fish
24 killed floated. The studies were done with different
25 species and this may explain the variations. No similar
26 work has been done with species found in the N.W.T. and
27 Beaufort Sea, to my knowledge.

28 The study done by M.R. Falk,
29 1973, then with the Fisheries and Marine Service, looked
30 into the effects of linear explosives on fish. The man-

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1 manufactures brochures on the explosives indicated little
2 or no lethal effect on fish and no independant studies
3 had been done to my knowledge prior to 1973. Falk's results
4 indicate and I quote

5 " From the combined results of experiments 1 and 2
6 it was evident that fish near the surface were more
7 susceptible to injury than those near the bottom"
8 Falk later describes the lethal range area for a given
9 size of charge , and I quote

10 " The LR 50's (the brackets here are mine-- Lethal
11 Range for 50 percent of the test organisms) were
12 found to be 50 and 12.5 feet at depths of 3 and 7
13 feet respectively for the combined results of exper-
14 iments 1 and 2. These values were used as reference
15 points to define the lethal zone surrounding the
16 Aqua[#]flex charge. This zone was extrapolated to the
17 surface at a horizontal distance of 80 feet. The
18 lethal areas at a depth of 7 feet, 3 feet and at
19 surface were calculated as 6,500 , 16,500 and
20 36,200 square feet respectively. The lethal volume
21 associated with 165 foot length of aquaflexdetonated
22 on the bottom at a depth of ten feet was then
23 185,000 cubic feet"

24 It can be seen from the data
25 available that explosives are lethal to fish, even when
26 used in relatively small charges such as are found in
27 the linear explosives. The area affected by a given
28 charge varies according to the size of charge, the type
29 of powder, the method of setting and shooting employed,
30 the bottom and the water conditions at the site. The

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1 effect of the charge on fish varies according to the
2 species of fish present, the abundance of fish present,
3 as well as the depth at which the fish happens to be, the
4 distance from and the orientation to the charge. Further-
5 more it has been reported in Fitch and Young, 1947 and
6 Knight in 1907 that fish are not frightened away by a
7 blast. It is possible that some species may even be
8 attracted to the site of a blast to feed on the dead and
9 injured fish.

10 Less is known of the effects of
11 explosives on sea mammals than for fish. Fitch and Young
12 in 1947, reported at least three occasions when California
13 sea lions were killed, but California grey whales observed
14 in the area of the blast were seemingly unaffected. The
15 Fisheries and Marine Service , Arctic Biological station
16 has endeavored to study this problem with ringed^{seals}. The
17 study can only be viewed as a preliminary assessment at
18 this point and no plans have been made for further work.
19 The report on the work done during the summer of 1975
20 by Dr. T. Smith has not been published as yet, but the
21 results were relayed to me through personal communication
22 with Dr. Smith. Briefly, out of six seals held at distances
23 varying from 50 feet to 500 feet, from a 50 pound charge
24 of 60 percent geogel, only one of the animals had any out-
25 ward signs of injury. The animal at the 50 foot station
26 developed a nose bleed following the blast, but post-
27 mortem examination did not indicate the injury was serious
28 and it was felt that the seal would have recovered.

29 From the little evidence avail-
30 able, and taking into consideration, the density of seals

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1 in any given area, it seems unlikely that a seismic prog-
2 ram could significantly affect the seal population by
3 way of the immediate lethal effects on the animals.

4 This does not preclude the possibility that the disturb-
5 ance caused in the area might affect the behavioral pat-
6 terns of the animals so as to cause them to abandon the
7 area. This could have a significant impact if it happened
8 in an area where suitable alternative sites were not
9 available or if it caused females to abandon pups or
10 pupping sites. During years when the animals are under
11 stress through natural circumstances these effects could
12 be amplified even more. These are certainly interesting
13 possibilities to examine but they are extremely difficult
14 and perhaps impossible to test.

15 Fitch and Young, in 1947, also
16 reported incidents of deaths of sea birds, particularly
17 those that dive for food. When the birds happen to be
18 submerged when a shot is fired. We have not observed any
19 comparable incidents with the programs we have monitored
20 to date, and this is probably a further indication that
21 no fish kills of any significance have resulted as it is
22 the dead fish that attract the birds to the area. On the
23 few occasions where we did find fish floating after a
24 seismic shot, we suspended the shooting operations.

25 In summary then, the use of
26 explosives in waters where fish are found, poses a threat
27 to local populations which must be protected. We are at
28 present providing this protection by requiring shots to
29 be buried in the bottom thus keeping pressures as low as
30 possible, encouraging the use of smaller charges, encour-

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1 aging industry to utilize other energy sources wherever
2 possible, and by encouraging investigations by industry
3 into the development of less biologically offensive
4 dynamites.

5 I would like to conclude by
6 mentioning briefly some to the non-explosive energy sources.
7 These include Flexotir, a small 2 ounce explosive charge
8 detonated in a perforated cast iron spherical shell or
9 cage, Vibroseis, which hydraulically generates vibrations,
10 or pardon me, hydraulically generated vibrations are directed
11 toward to the sea by means of transducers.
12 Hydrosein; this system generates a powerful energy wave-
13 front by means of implosion created by a massive cavitat-
14 ion through the action of a piston in a piston chamber.
15 Gas source seismic profiles; these involve ignition of a
16 mixtures of acetylene and oxygen in a rubber tube which
17 exerts a pressure of about 300 pounds per square inch.
18 Dinoseis: this uses a mixture of propane and oxygen
19 ignited in an expandable chamber. The exhaust gases are
20 vented to the surface. Flex-o-gun, which is similar to
21 dinoseis but the propane mixture igniting works against
22 a moveable piston. Aquapulse: propane and oxygen are
23 ignited in an elastic walled container. Sparker: a high
24 voltage condensers discharge electrical energy into cables
25 towed behind a vessel. Discharge through electrodes in the
26 water causes formation of steam bubbles, the wire exploder
27 which is modified and more efficient version. Hydrosonde
28 similar to the echo sounding using a spark ignition of
29 gases or water displacement to create high energy sound
30 pulses, Vaporchoc : energy is released when a bubble of

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1 steam collapses and hydrostatic pressure causes rapid
2 inflowing of water, and the Par Air Gun: high pressure
3 release of air directly into the surrounding medium.
4 These descriptions were taken from the Falk and Lawrence
5 report of 1973, which I will refer you to if you want
6 further descriptions of those systems.

7 These systems, with the exception of the air gun
8 are not being used in the N.W.T. for various technical
9 and logistical reasons. They do not produce suitable re-
10 cordings in this area, or the equipment is too large and
11 bulky to use in shallow water where the size of boats is
12 restricted. Winter operation is hampered by freezing and
13 breaking of the equipment which must be immersed and with-
14 drawn from the water many times in each line.

15 The air gun has been used quite
16 extensively in deep water, ten feet or deeper, in the
17 Beaufort Sea and has been found to produce acceptable
18 seismic data. The equipment is large and is usually
19 mounted on large vessels which limits its use to water
20 over 20 feet deep. Falk conducted a brief study on the
21 air gun's effect on fish. His results show a lethal
22 radius for a 300 cubic inch gun to be between 2 and 5 feet.
23 We have encouraged the use of this method wherever it is
24 feasible and we feel quite confident that it has little
25 or no effect on the fish in the area of its use.

26 In September of 1974, a fish kill
27 off Toker Point was reported to us. We investigated the
28 report and found no sign of dead fish as the ice had
29 formed before we had an opportunity to get out to the
30 site. However, Mr. John Raddi, who initially found the

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1 kill had collected several specimens , and these were sent
2 to the Freshwater Institute in Winnipeg for autopsy. The
3 results could not give a cause of death, however it did
4 discount explosives as a possible cause.

5 In January of 1975 another kill
6 was reported off Atkinson Point and again samples were
7 collected and sent out for autopsy. The examination of
8 these fish failed to determine the cause of death ,but
9 again discounted explosives. It is interesting to note
10 that similar fish kills had been observed in the past by
11 Mr. Raddi Kowalchuk and Mr. Charlie Gruben, both residents
12 of Tuk and others. It appears that such kills may be a
13 natural phenomenon.

14 It has been reported that large
15 number of fish may become subjected to a super-cooling
16 effect when ice crystals form suddenly in the water. This
17 cooling in turn causes the formation of ice crystals in
18 the blood of the fish resulting in rupturing of blood
19 vessels particularly in the gills. The samples which were
20 sent to Winnipeg from Atkinson Point kill were examined
21 for signs of this phenomenon. Although some minor gill
22 damage was noted the formation of ice crystals in the
23 blood was discounted as the cause of death. The damage
24 to the gills was attributed to post mortem effect.

25 There had been an airgun seismic
26 program off Toker Point prior to that kill being reported
27 but our records do not show any programs off Atkinson
28 Point. Our investigation of the operator who was working
29 off Toker Point did not produce any evidence of the use
30 of explosives and the operator assured us that airguns only

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1 were used.

2 I believe further study of the
3 airgun's effect on fish are warranted. These should in-
4 clude the use of arrays of guns as well as the single
5 gun and the sub-lethal as well as the lethal effects on
6 fish.

7 At this point I would like to
8 change the subject and go into the role of enforcement
9 which is really the area that I'm most familiar with.

10 The role of the Fisheries and
11 Marine Service in the N.W.T. is a management/enforcement
12 role. Traditionally, the management role was viewed as
13 a research function and enforcement was seen as a tool
14 of management. Now, I personally disagree with this
15 philosophy and over the past few years I have been able
16 to advance the idea that enforcement is an integral part
17 of management. The best conceived management program is
18 only as successful as the enforcement staff's ability to
19 implement it. Because our staff in the N.W.T. is made up
20 primarily of enforcement officers, decisions regarding
21 commercial quotas, catch and possession limits for anglers
22 and regulations quite often are made by the enforcement
23 officers acting on advice of our professional staff with
24 the Freshwater Institute in Winnipeg.

25 Part of managing any renewable
26 resource involves the protection of habitat. Prior to
27 1970 and 71, this was not a major part of the enforcement
28 role, but as industrial activities such as oil and gas
29 exploration, mining and highway construction increased,
30 the need for active participation in the approval system

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1 became obvious. Consequently a major part of our activit-
2 ies are now directed to this field.

3 The officers that are working
4 in the N.W.T. are for the most part experienced in many
5 diverse subjects. This experience has been gained through
6 actual involvement with the development over the past
7 four years and is a continuing growth situation. We have
8 been fortunate in experiencing a low incidence of staff
9 turnovers and I attribute that to the dedication of the
10 individuals involved, and to the flexible policies of
11 this department. Although many people within our depart-
12 ment dislike the police image, in fact our agency is a
13 police force. The officers receive training in all aspects
14 of crime investigation and legal procedures and a continu-
15 ing program of upgrading in this field is necessary.

16 The Fishery Officer is called
17 upon to investigate reports of pollution, violations of
18 fisheries regulations and violations of permit conditions
19 and he is expected to take whatever action is called for
20 quickly and efficiently often without the benefit of ad-
21 vice from senior officers. If a prosecution is to be con-
22 sidered, the evidence must be collected as soon as possible
23 after the violation occurs and it must be handled in a
24 manner acceptable to the Courts.

25 The decision to institute pros-
26 ecution proceedings is usually made by the investigating
27 officer. However in complex cases involving lab reports,
28 photographic evidence, expert witnesses and statements
29 and other documentary evidence the decision to prosecute
30 is usually made in consultation with the Chief of Enforce-

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1 ment. The decision is usually a complicated one to make
2 with consideration given to all of the evidence involved,
3 the applicable legislation, and a weighing of the alter-
4 natives. This decision is never taken lightly.

5 The objectives must always be
6 foremost in the officer's mind. These are to protect the
7 habitat and to ensure the continued well being of the
8 resource. Constant surveillance is required to keep up
9 with the many activities going on simultaneously through-
10 out the year, and this requires a considerable budget for
11 travelling, in most cases by charter aircraft. We make
12 use of industry funded transportation and accomodation
13 as much as is possible but independent funding is still
14 required if thorough surveillance is to be maintained.

15 Legislation generally trails
16 industrial development, leaving the enforcement officer
17 having to apply general legislation to specific problems
18 which may not have been forseen when the legislation was
19 enacted. A good example is the application of Section 33(2)
20 of the Fisheries Act in cases involving oil spills. There
21 are often many pieces of legislation which may apply in
22 any given situation and it is necessary for the agencies
23 involved to coordinate their approach to the problem.
24 This has not been a serious problem to date, however I
25 feel it should be borne in mind as new regulations are
26 being considered.

27 I also feel that government must
28 address itself to cleaning up its own back yard as well
29 as that of its industrial neighbours. There is some effort
30 being made right now through controls of Federal facilities

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1 through the institution of the environmental assessment
2 and review process and research into waste treatment of
3 equipment for small communities but there are still exam-
4 ples around of poor housekeeping by government agencies
5 and Crown corporations. Fuel storage facilities at DEW
6 line sites for example were substandard as of last year.
7 One fuel spill in Yellowknife in 1972, which continued
8 to release oil into Great Slave Lake for three years in-
9 volved a Crown Corporation, and on that case I was advised
10 that I could not take legal action against the Crown
11 corporation. The expense of clean-up was subsequently
12 borne by government. I point these out because I feel that
13 development along the Mackenzie is going to involve in-
14 crease activity by Crown corporations, and right now
15 they are in the position of holding a rather unique pos-
16 ition with regards to the regulations that apply. Now, I
17 feel that it is incumbent upon government to conduct its
18 own affairs in an exemplary manner and to set the example
19 for industry, and I think this generally has been accepted
20 and is being put forward by the Federal Government.

21 When drafting legislation which
22 is meant to apply to the protection of natural resources
23 from the side effects of industrial development, I feel it
24 is desirable to separate the regulations according to
25 the degree to which enforcement is to be carried out.
26 For example, where technology is not yet available to
27 completely remove specific substances from an effluent,
28 regulations which strictly prohibit the discharge of that
29 substance may not be desirable. Alternatively a maximum
30 concentration may be stipulated with a compliance sched-

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1 ule to meet the ultimate desirable level. Another alter-
2 native may be to issue guidelines for the interim period
3 while research and development of treatment facilities is
4 underway.

5 Once regulations are passed they
6 should be enforced impartially. The enforcement officer
7 must exercise some discretion in his investigation and
8 preparation of the case but the decision as to whether
9 to proceed with the prosecution should be a question of
10 law, and not subject to the administrative or executive
11 influence. The use of a threat to prosecute to achieve
12 compliance by a violator in my mind, is synonomous with
13 blackmail and denies the accused the right to defend him-
14 self in a proper public forum, the Court room. On the other
15 hand, the public has a right to know what is happening and
16 that the agencies responsible for enforcement of the
17 regulations are doing their jobs.

18 Penalties provided for violations
19 of some legislation are not usually a deterrant to large
20 companies. The Fisheries Act for example provides for
21 a \$1000.00 fine for most offences and \$5000.00 fine for
22 offences against Section 33, the pollution section.
23 There is also the possibility of a charge on each day
24 the offence occurs or continues. The amounts of fines
25 received to date have varied from a few hundred dollars
26 to \$10,000.00 which are not very significant in compar-
27 ison to the profits of most large companies. The greatest
28 dettarrant is usually the public exposure that results
29 from the case. Rather than raising the level of fines,
30 however, I would prefer to see the Courts order the offend-

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1 er to cover the cost of clean-up and restoration or to
2 contribute to the development of improved technology.

3 Now, this philosophy may be
4 over simplifying a complex problem but the objectives
5 as I see it is to have the administration of regulations
6 as open as possible and to achieve a standard approach
7 to justice which ensure the impartiality of the enforce-
8 ment program.

9 MR. BAYLY: Mr. Commissioner,
10 that completes the evidence in chief, of Mr. Trudeau, and
11 I notice that it's ten to five. In your hands sir, but
12 it may be appropriate to commence the cross-examination
13 tomorrow, unless it's likely that it could be completed
14 this afternoon.

15 MR. GOUDGE: I think it would
16 be of assistance if we could break until tomorrow sir.

17 THE COMMISSIONER: Yes, I
18 think it would be helpful. It's a lot of worthwhile
19 suggestions in Mr. Trudeau's evidence that apply to the
20 work of the Inquiry and I think counsel might consider
21 overnight the matters they wish to raise with them.

22 MR. GOUDGE: Sir, may I simply
23 pose for us all sir, a question of how you wish to proceed
24 in the morning? Mr. Milne is returning I think to-
25 morrow for the completion of his cross-examination.

26 MR. EVANS: Are you aware of
27 when Mr. Milne will be available? Will he be here first
28 thing in the morning?

29 MR. BAYLY: My understanding
30 is that he's coming in on tonight's plane, but I'll have

H. Trudeau
In Chief

1 to have that confirmed.

2 MR. GOUDGE: Perhaps then,
3 sir we could take five minutes after the adjournment and
4 counsel could get together and discuss the order for
5 tomorrow.

6 THE COMMISSIONER: Yes, you
7 decide whether you want Mr. Milne to have precedence
8 over Mr. Trudeau, or Mr. Trudeau have precedence over
9 Mr. Milne. Just consider the convenience of these two
10 gentlemen. That's the main thing.

11 MR. GOUDGE: Yes sir.

12 MR. BAYLY: I'd just as soon
13 have only one in dangling sir, if that--

14 MR. GOUDGE: We can talk now
15 sir about that.

16 MR. MARSHALL: Mr. Commissioner,
17 before we break I wonder if I could make a short announce-
18 ment. There has been a growing concern expressed by many
19 about the adverse impacts of overeating, overdrinking,
20 and under exercise by persons involved with this Inquiry.
21 Now, these effects have been seen to be both cumulative
22 and synergistic. Further it's been pointed out, particu-
23 larly by Mr. Goudge that some involved with the Inquiry
24 are becoming cranky. As a result some exercise seemed to
25 be in order, and accordingly my secretary Miss Brissette
26 has arranged for a volley ball court to be available at
27 Grollier Hall on the boys side for eight P.M. this
28 evening, and it is hoped that those, particularly the
29 cranky members of the Inquiry could attend for a little
30 work out.

H. Trudeau
In Chief

1 MR. EVANS: We assume that
2 Mr. Marshall will be in attendance.

3 THE COMMISSIONER: Well,
4 we'll adjourn until nine thirty then.

5 (QUALIFICATIONS AND EVIDENCE OF HUGH' MONAGHAN
6 MARKED EXHIBIT 481)

7 (QUALIFICATIONS AND EVIDENCE OF H. TRUDEAU
8 MARKED EXHIBIT 482)

9 (PROCEEDINGS ADJOURNED TO FEBRUARY 18,1976)

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